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Boat People Easing OP Labor Shortage

effry Beeler
CW West Coast Bureau

LOS ANGELES — Homeless Vietnamese "boat people" could be a partial solution to the California electronics industry's acute and growing labor shortage.

Almost three dozen of the refugees have already found — or are in the process of finding — jobs with West Coast semiconductor and computer equipment manufacturers, and many more Vietnamese immigrants are expected to follow their lead soon.

The boat people's entry into this high-technology field is being spearheaded by the International Rescue Committee, a resettlement agency that three months ago launched a campaign to convince electronics firms to fill their job vacancies with new arrivals from Southeast Asia. To date, more than two dozen California high-technology companies have contacted the agency about possible employment openings.

Although no one knows yet whether the budding program will succeed, it has already reaped benefits for both refugee and employer alike, ac-

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DOS/VSE Users Affected
IBM Drops IPO/E Policy...

By Nancy French
CW Staff

WHITE PLAINS, N.Y. — In a little noticed move, IBM earlier this fall dropped its policy requiring users to purchase all of the base licensed programs that comprise the System Installation Productivity Option/Extended (IPO/E) tape for the DOS/VSE operating system.

The tape contains a minimum of eight program products. Under IBM's previous policy, the user who wanted the IPO/E tape had to pay for "the full complement of base products" whether or not it wanted them all.

IBM maintained this policy despite the fact that these were offered as separately priced products when they were announced along with the 4300 series of machines.

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... And ADR Returns 'Vollie'

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) has announced a replacement for IBM's VSE/ICCF — the on-line program development system for the VSE operating system announced along with the 4300 series of mainframes.

The replacement, which will be available in the second quarter of 1980, is essentially an upgraded version of ADR's Vollie, presently used by about 500 DOS/VS users for on-line program development.

The latest version of Vollie will allow VSE users to support the interactive use of IBM's System Installation Productivity Option/Extended (IPO/E) tape of program products and totally replace VSE/ICCF, according to ADR.

Under IBM's new policy, which allows users to purchase less than the full complement of programs on the IPO/E tape, users can obtain Vollie as a substitute for VSE/ICCF. They will not have to order or pay for VSE/-ICCF, for a savings of $80/mo, ADR said.

When using Vollie with System IPO/E, no changes are required to any

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DEC Unveils Mid-Range PDP-11/44 Mini

By John Whitmarsh
CW Staff

MAYNARD, Mass. — Digital Equipment Corp. last week unveiled a new mid-range minicomputer, the PDP-11/44, that reportedly packs twice the performance of the smaller PDP-11/34 but carries a price tag only 20% higher.

The company also announced the DEC Datasystem 540, a commercial processing system that incorporates the PDP-11/44 and offers a newly introduced disk drive, the RL02, as a system option.

The general-purpose PDP-11/44 can be purchased as a separate CPU or in standard system configurations. Separately, the CPU includes a minimum 256K-byte EEC MOS semiconductor memory, two serial line units, microprocessor-controlled Ascii interface, 8K bytes of cache memory and a power supply.

Optional equipment includes a 1M-byte memory, a floating-point processor and a commercial instruction set processor.

The CPU costs $23,900, with volume deliveries scheduled to begin in June.

Configured for end-user applications, a typical PDP-11/44 system includes the CPU, dual TU58 Dectape II drives, a Decwriter III terminal and a choice of mass storage devices, including the 10M-byte RL02 disk drive.

The prices of PDP-11/44 systems range from $44,900 to $94,700, depending on hardware and software selections.

The DEC Datasystem 540 is a PDP-11/44-based mid-range system that falls between the low-end Datasystem 530 and the top-of-the-line Datasystem 570. It includes a commercial instruction set processor, remote diagnostic capabilities and up to 1M byte of memory.

Using an improved version of the CTS-500 executive and an enhanced Cobol compiler, the Datasystem 540 improves response times and program execution by 50%, the vendor claimed.

The system can be configured with a variety of mass storage peripherals, in-

(Continued on Page 6)

Future CPUs Seen Saving Users' Software

By Howard A. Karten
CW Staff

SILVER SPRING, Md. — Demands by users for the stability and smooth evolution of application systems will be translated into new generations of computer hardware that are compatible with their predecessors, according to Stephen G. Jerritts, vice-president and general manager of Honeywell, Inc.'s U.S. Information Systems Group.

In the keynote address at the Computer Systems Enhancement Symposium held here last week by the Data Processing Management Association (DPMA) Education Foundation, Jerritts acknowledged that "computer manufacturers have not always felt the economic need to protect the [software] investments for their users." However, the situation is being rectified today because vendors have recognized that need as "paramount."

"The investments of existing computer users in programs and files may seem a mundane issue to some when compared with the glamour of magnetic bubbles, charged coupled devices, bipolar circuits and the like. However, the issue of investment protection has become a major guiding principle in systems architecture planning," the veteran of IBM and General Electric Co. stated.

Quoting the Irish poet William Butler Yeats, who wrote "All changed, changed utterly/A terrible beauty is

(Continued on Page 4)

Norad System Goofs, Calls Missile Alert

By Tom Henkel
CW Staff

COLORADO SPRINGS, Colo. — The North American Air Defense Command (Norad) is conducting a secret investigation to determine what went awry when its experimental computer system mistook a simulated missile attack as the real thing during a Nov. 6 test.

Norad swears its technicians, who loaded the simulation tape onto the system, are not at fault. The agency is blaming the experimental Honeywell, Inc. 427M — a top-secret system designed specifically for Norad — as the culprit.

Although Norad won't say what it thinks went wrong, officials admit they are making a hurry-up effort to find out. Sources at Norad said a report was supposed to be completed late last week, but a spokesman said the report's contents may never be released.

Norad is keeping closemouthed about the whole incident, claiming that if it explains what happened, the Soviets will know too much about a weak link in the U.S. strategic defense system.

No Details on CPU

Norad is also keeping closemouthed about the Honeywell 427M. Maintaining that such details are top secret, it refused to say what the CPU is supposed to do, how it does it or even how many bytes of memory it uses.

It did say, however, that the 427M is a big system that replaced an aging Philco 2000.

If the Soviets haven't yet figured out what went wrong with the system, they sure know about the results — and they aren't pleased.

When the 427M mistook the simulated attack as the real thing, it automatically notified three Air Force bases. In turn, the bases dispatched an intercept force of four F-106 aircraft — two from the Kingsley Field, Ore., base and two from the Sawyer Air Force Base in

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Goes to Committee With Amendments

DP Crime Bill Progresses in Senate

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The federal computer crime bill moved a step closer to congressional ratification when it recently received unanimous approval from a Senate subcommittee after significant changes were made to the bill's language.

The Senate Criminal Justice Subcommittee approved the legislation Nov. 6 after the panel reduced the prescribed penalty for computer fraud and abuse, refined the bill's definition of a computer and established guidelines for invoking federal jurisdiction for computer crime prosecution. The bill covers all computers used by the federal government, by financial institutions or in interstate commerce.

As introduced in January by Sen. Abraham Ribicoff (D-Conn.), the Federal Computer Systems Protection Act of 1979 called for penalties of two and one-half times the amount obtained through the crime or $50,000 and/or 15 years in prison [CW, Feb. 12]. It now calls for fines of two times the amount lost or $50,000, whichever is higher, and/or five years in jail.

The subcommittee reduced the prison term to bring the legislation into conformity with current wire and mail fraud statutes and make the bill consistent with criminal code reform legislation now being considered by Congress, according to subcommittee counsel Kathy Zebrowski. The 15-year penalty was "really not equitable in light of similar statutes," Zebrowski said, voicing the opinion that such a long prison term "would not have been imposed anyway."

She added that the criminal code revision calls for no parole, which means that anyone sentenced to five years for computer crime would serve the full five years.

The subcommittee did not consider adding a possible misdemeanor charge to the legislation, as several DP industry representatives have suggested. The bill would make all computer crimes felonies.

The general basis for defining a misdemeanor is by the value of the property stolen; a misdemeanor provision here "just wasn't practical," Zebrowski said. For example, courts would have difficulty placing a dollar value on information contained on a stolen magnetic tape.

Broad Definition

While the original legislation included detailed definitions of computers, computer systems and networks, software and programs, the new language contains only a basic description of a computer. "We had to put in a very broad definition of computer in large part to ensure that we reach next week's computers as well as last week's computers," Zebrowski said.

Two pages of computer definitions in the original bill have been narrowed to a single paragraph that defines a computer as "a device that performs logical, arithmetic and storage functions by electronic manipulation and includes any property and communication facility directly related to or operating in conjunction with such a device."

Critics of the bill, including computer crime expert Donn Parker of SRI International, had charged that advances in computer architecture would make the law's definitions obsolete over the years [CW, March 5].

Agreeing with additional concerns of the DP industry, the subcommittee specifically exempted automated typewriters, home computers and handheld calculators from the definition. Zebrowski said subcommittee members felt misuse of home computers is a matter for state jurisdiction.

Concern over who should prosecute computer crimes prompted the subcommittee to add a lengthy section to the bill specifying situations in which the federal government should claim jurisdiction.

The bill now states that when federal jurisdiction "exists concurrently with state or local jurisdictions," federal law enforcement officers, in determining whether to exercise jurisdiction, should consider, among other things:

- "The relative gravity of the federal offense and the state or local offense."
- "The relative interest in federal investigation or prosecution."
- "The resources available to the federal authorities and the state or local authorities."

The legislation now goes to the full Senate Judiciary Committee for consideration. Zebrowski said the bill's immediate future is clouded by the fact that Congress is entering a campaign year and the Senate is still bogged down in debate over the Salt II treaty.

She also noted that the bill has yet to be introduced in the House of Representatives during this session of Congress. However, "the fact that there has been some movement" on the legislation in the Senate may prod the House to act on the proposal, she added.

Corrections

The headline for a story on an ex-vendor salesman's indictment for fraud [CW, Nov. 12], incorrectly named his former employers. The charges related to the man's employment with Computer Sciences Corp. (CSC) as well as another vendor, not Control Data Corp. (CDC).

Several prices in the In Depth "How to Choose Your Next System" [CW, Oct. 29] were in error. The approximate price of a used 512K-byte IBM 370/135 (Model 1 or 3) was $75,000 as of August, while the price of a used 2M-byte 370/145 (Model 1 or 3) was $115,000.

The IBM list price for a new 2M-byte 370/155-II was $2.2 million including memory, console, channels and DAT, and a new 3M-byte 370/165-II listed for $4.2 million.

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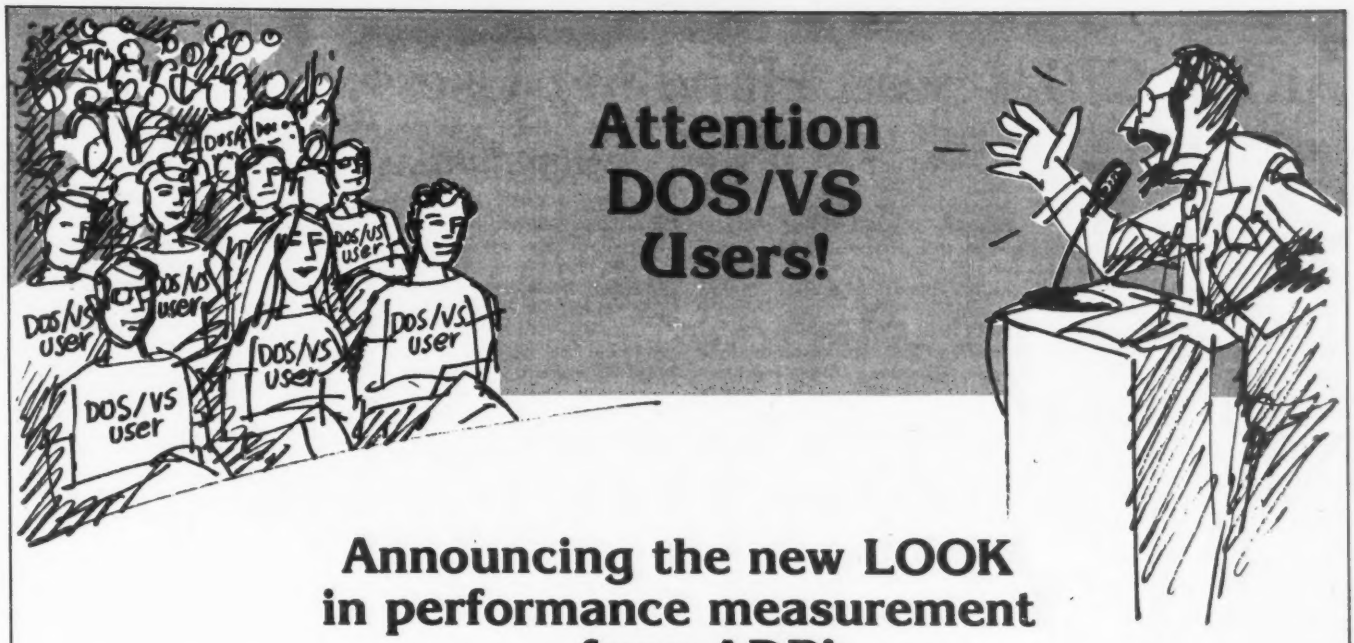

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Future CPUs Seen Handling Users' Software

(Continued from Page 1)

born." Jerritts noted that a mere 10 years ago, the minicomputer industry was an infant and the microprocessor had not yet appeared on the scene.

Today, however, "we read stories on microprocessors that suggest many potential users already face the prospect of spending $150,000 on software" to run a $10 device. And, despite the improvement in price/-performance ratio, Honeywell for one will spend more than 50% of its research and development dollars on software.

That represents a significant increase over the situation 15 years ago, when it spent 30% of its development funds on software, Jerritts pointed out.

Incremental Increases

Noting that the demand for DP services is rising within most organizations, overloading existing applications and leading to a demand for more DP power, Jerritts asserted that "users are wanting to add processing power in incremental steps, rather than with whole new systems."

The industry is becoming increasingly service-oriented, Jerritts said. Geographic dispersion of processors and terminals makes service more important, "as does the complexity of integrating hardware, software and communications technologies into unified systems."

Moreover, factory automation is beginning to merge with "mainstream" DP, and users are striving to bring local DP power to the shop floor in order to monitor production and give factory management up-to-the-minute status reports of work in progress. "The next step will be to tie these minis and their local data bases into the central host processor and its master data base," according to Jerritts, whose company makes automated process control equipment.

But future trends and their benefits to users will not be driven solely by a greater assortment of less expensive goodies from mainframers, Jerritts predicted. "The explosion of application options available from telecommunications services and from the [postal, telephone and telegraph administrations] in Europe will absolutely mushroom in the '80s," he said. "This growth, in terms of more reliable services at a decreasing cost, will continue to broaden the impact of computers in [user] organizations."

Separate hardware and software pricing — unbundling — is another trend he sees continuing in the '80s: "Most of you would agree that this makes economic sense and provides added flexibility to users."

'Standardization' the Word

SILVER SPRING, Md. — "Standardization" will be the keyword of the future, according to Stephen G. Jerritts, vice-president and general manager of Honeywell, Inc.'s U.S. Information Systems Group.

Speaking at a symposium held here last week by the Data Processing Management Association's Education Foundation, Jerritts cited five areas he believes will see greater standardization.

First, there will be greater standardization of communications protocols to achieve what he called "unification at network level.

"It's apparent to me that there will be a general trend toward worldwide standards such as X.25. At the very least, vendors will offer you compatibility with the major value-added networks and the network standards of their major competitors."

Second, Jerritts predicted standardization of end-user functions, including architecture, language interfaces, forms interfaces and common terminal family hardware and software architecture. These will have to mesh with other industry standards, such as the proposed Codasyl forms interface standard.

Next, distributed systems will become standardized, at least to the point that file and program interchange among a manufacturer's offerings will be possible. This interchange standard may also permit easier interfacing between hardware and software from competitors.

Fourth, data management facilities and languages will standardized to permit greater and easier data sharing among scattered installations.

Finally, maintenance will become standardized, lowering maintenance costs and increasing the speed of hardware maintenance for users.

Electronics Firms Hiring Boat People

(Continued from Page 1)

cording to Robert Lewis, an employment specialist for the International Rescue Committee.

For the Vietnamese, the plan means economic self-sufficiency, the opportunity for a new life far from the hardship and oppression of their native country and the start of acculturation in their sometimes bewildering adopted homeland.

For the semiconductor and computer equipment vendors, the program means access to a potentially large new work force that could go a long way toward easing the California electronics industry's current labor shortfall, which for production-line jobs alone totals an estimated 24,000 positions.

Most of the electronics companies that have hired Vietnamese boat people through the International Rescue Committee's placement program have found their new employees both industrious and loyal, Lewis said. "The employees who have been cooperating with us have turned out to be quite satisfied with the results thus far, and we have been getting some good placements in the electronics industry," he added.

Although some of the refugees possess technical and language skills that qualify them for more advanced positions, most find work as equipment assemblers and testers or entry-level jobs requiring minimal expertise in electronics.

Placement Efforts

In securing work for Vietnamese under his care, Lewis screens each prospective employer to make sure the "company is solid, has good working conditions and will provide adequate training and an opportunity for advancement," he said.

Lewis at first restricted his placement efforts to firms belonging to the American Electronics Association (AEA), but since then has widened the job hunt to include non-AEA companies as well.

Some of the California high-technology firms that have hired boat people through the committee's program include Canoga Park-based Magnetic Technology Corp., which employs four Vietnamese boat people, and Culver City-based Arnold Magnetics Corp., which employs a Vietnamese test technician.

Lewis also anticipates placing assemblers and other workers at Alpha Data, Inc. of Chatsworth and at Neff Instrument Corp. of Monrovia.

Training Needed

Because most of the refugees are relatively unfamiliar with Western culture, they typically require vocational training as well as instruction in English before they are ready to assume even production-line jobs in the high-technology field.

But with the shortage of skilled electronics personnel steadily growing, most of the semiconductor and computer equipment manufacturers participating in the program have welcomed the Vietnamese immigrants anyway, even if they have to train the newcomers themselves, Lewis said.

The problem of finding homes for the refugees rests mainly with the committee.

Companies interested in possibly filling their job vacancies with Vietnamese workers should contact their International Rescue Committee office in either Los Angeles, San Francisco or San Diego. More information about the committee's job-placement program may be obtained from Lewis at the International Rescue Committee, 500 S. Lucas Ave., Los Angeles, Calif. 90017.

Norad Probing False Alert

(Continued from Page 1)

Michigan — along with six F-101s from a Canadian Forces base in British Columbia.

The computer bungle was discovered and corrected within six minutes, but it was too late to stop the intercept force. By uncovering the error early, however, Norad was able to stop the dispatch of U.S. B-52 bombers, which can carry armed missiles, a Norad spokesman said.

Obviously upset by the bungle, the Soviet news agency Tass warned that another false alert could have "irreparable consequences for the whole world."

At this point, all Norad will say about the false alert is, "The proper tape was put in, and we don't think it was a human error."

Norad was criticized in the past for using the Philco 2000, a system many regard as a DP dinosaur. Some Norad officials said last week they wonder whether the new system will be any better than the reasonably reliable 2000.

Dec. 10-12 Seminar To Focus on Security

LAS VEGAS — Keeping your computer system and data files safe and sound will be the topic of a three-day seminar Dec. 10-12 at the Sahara Hotel here.

Sponsored by Data Processing Security, Inc., (DPS), the seminar will deal with physical security of the computer room, data security, fire protection, DP auditing, risk analysis and contingency and recovery planning.

The seminar costs $425, DPS said from 235 Northeast Loop 820, Hurst, Texas 76053.

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CA

Despite Fate of Itel Corp.

National Semi Official Sees PCMs Continuing

By Howard A. Karten
CW Staff

SILVER SPRING, MD. — Although Itel Corp. may soon be all but forgotten as a supplier of mainframes which are software-compatible with IBM processors, that by no means signifies the death of the plug-compatible mainframe (PCM) business. In fact, coming years will probably see other firms entering the business, a National Semiconductor Corp. official said here last week.

Speaking at the Computer Systems Enhancement Symposium sponsored by the Data Processing Management Association (DPMA) Education Foundation, Jim Ashbrook, National Semi's director of market planning, cited several factors to back up his contention.

IBM 360 and 370 software architecture "is well on its way to becoming the de facto industry standard," Ashbrook said. Given user investments in software, this will be an attractive market in which to compete.

Moreover, the economics of semiconductor production will make it more profitable for semiconductor makers themselves to build computers. For example, the cost of producing a memory chip is roughly $8 — $4 for the integrated circuit (IC) itself and $4 for the packaging of the chip. This figure will probably remain constant even as the number of bytes per chip increases.

However, the situation is drastically different for small-, medium- and large-scale integration logic chips. The packaging cost for a chip stays constant in future projections at about $6 each.

Right now, SSI or MSI chips cost about 50 cents for the IC without the packaging. But as very large-scale integration (VLSI) becomes prominent, the cost of the logic portion of the chip will soar to about $77, and the IC cost will account for more than 90% of the cost of the chip.

VLSI economics will mean that the semiconductor portion of a system will amount to roughly 60% of its costs.

Taking his idea a step further, Ashbrook indicated that with software standardized, semiconductor houses will have all the expertise they need to make and sell computers; the value-added concept and vertical integration will be the driving force in semiconductor houses' move into complete production systems.

Second sourcing — which gives users the ability to buy the same functions from more than one vendor — is also contributing to the continuing success of the PCM makers.

Turning his attention to IBM and its products, Ashbrook said he believes IBM's recent price reduction [CW, Nov. 5] "may be more of a financial manipulation for its cash flow situation" than a price cut in anticipation of IBM's H series, Ashbrook said.

"We expect a high-end machine that would compete with Amdahl Corp. systems [to be announced initially], followed later by smaller machines. The H series could be introduced in the spring of 1980 or even later," he predicted.

In any case, the lead time between the announcement and delivery of the system to customers will probably be shorter than in the past, Ashbrook predicted.

CW At DPMA

Judgment Asked To Bar I/O Rule

WASHINGTON, D.C. — Four major computer manufacturers fighting a federal I/O interface standard have asked a federal court here for a summary judgment to block the standard's scheduled Dec. 13 implementation.

In a combined Nov. 7 filing, the four companies — Control Data Corp., Burroughs Corp., Honeywell Inc. and Sperry Corp. — charged that the standard is "unlawful "because it is "arbitrary and capricious" and because former Commerce Secretary Juanita Kreps exceeded her authority in adopting the I/O standard and three related standards that are also subjects of the suit.

The four firms originally filed separate suits last month to block adoption of the standards, arguing that several years and millions of dollars would be needed to comply with them [CW, Oct. 22, 29]. The standards would become mandatory for all federal procurements of equipment larger than minicomputers.

Three weeks ago, the Commerce Department replied to the suits by filing a motion for their dismissal, contending the matter is not subject to judicial review.

In voluminous supporting documents submitted with the motion for a summary judgment, the four companies reiterated their contention that until they can modify their offerings to comply with the standards, their government trade will be severely damaged to the benefit of IBM, on whose architecture the four standards are based.

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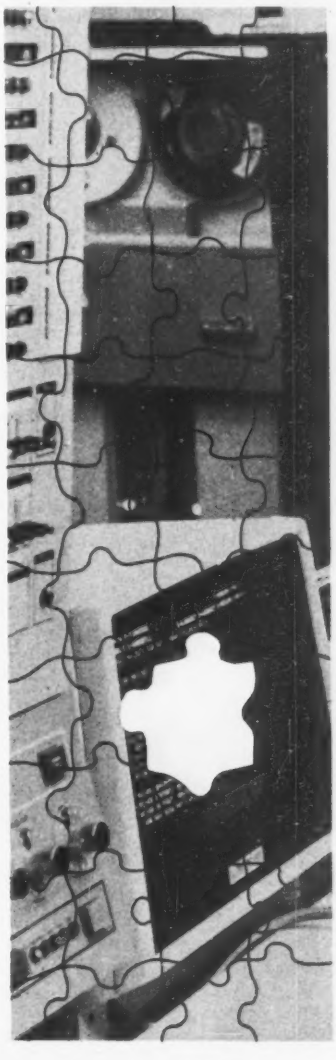

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Housing Shortage Seen Crippling Silicon Valley

By Jeffry Beeler
CW West Coast Bureau

SAN JOSE, Calif. — Silicon Valley should curb its industrial expansion until the region can enlarge its housing supply, transportation systems and other facilities to absorb further population growth, an interdisciplinary study group urged here recently.

Failure to ease the Valley's acute housing shortage and curtail its uncontrolled job growth could deal a "crippling blow" to the area's many computer equipment and semiconductor manufacturers, the group warned in a report released earlier this month.

The report was prepared by the Santa Clara County Industry and Housing Management Task Force, which consists of 20 members representing government, industry, labor and other groups. Formed last August by the county's Board of Supervisors, the task force was charged with identifying the area's current growth-related problems and with estimating the amount of expansion the county, including Silicon Valley, could safely accommodate in the future.

Growth Management Plan

Based on a year-long study of the region's notorious jobs-housing imbalance, the report outlined a broad framework for managing Silicon Valley's long-term growth and urged local high-technology firms to support the proposed plan by:

- Locating future plant sites outside the Valley whenever possible.
- Cooperating with both the public and private sectors to provide affordable housing.
- Helping local government monitor the impact of the area's growth plans.

If Silicon Valley firms fail to comply with these and other recommendations, the study group will seek a moratorium on industrial building permits and take other "severe" steps to slow expansion, the report warned.

Other facets of the group's growth-management plan include proposals for:

- Limiting existing industrial areas to their current job density.
- Controlling business expansion in localities with insufficient housing.
- Rezoning vacant industrial land to block additional plant construction.
- Providing incentives for private developers to undertake projects that combine residential and commercial facilities.

Although the task force linked the county's rapid industrial growth to several social and economic ills, the report paid particular attention to the area's severe housing shortage.

New residents, lured by the region's unprecedented economic prosperity, have flocked to Silicon Valley and surrounding Santa Clara County much faster than new houses have been built to accommodate them, the report noted. The resulting oversupply of prospective new homeowners has produced a tight real estate market that has pushed housing prices far beyond the financial reach of all but the most affluent buyers.

Today, for example, the average single-family dwelling here costs $92,000, compared with $50,000 just three years ago and $33,000 just six years ago, the task force found.

With vacant houses either unavailable or unaffordable, local computer equipment and semiconductor companies have found themselves increasingly unable to recruit enough skilled workers to meet their rapidly growing labor needs. High demand for personnel, in turn, has led to skyrocketing wages and salaries and has left many area electronics firms hard pressed to compete effectively with high-technology companies elsewhere in the U.S., the report said.

To make matters worse, the local housing shortage threatens to become even more serious in the future, particularly in Silicon Valley, where Santa Clara County's greatest job growth is expected to occur. Between 1975 and 1990, the report projected, the Valley will expand its housing base by only about 19,000 units, a 14% increase.

At the same time, however, the number of job openings in the five Valley communities of Palo Alto, Mountain View, Sunnyvale, Santa Clara and Cupertino will jump an estimated 56% to almost 368,000, the task force predicted. Some group members fear the region's job growth will significantly exceed their estimates, which they admit are probably conservative.

Mid-Range Unit Extends PDP-11 Line

(Continued from Page 1)

cluding the RL02 disk system.

A minimum Datasystem 540 with 256K bytes of main memory, dual RL02 disk drives (20M bytes) and the CTS-500 operating system costs $54,000. The larger configuration that includes a 512K-byte memory; 67M-byte RM02 disk drive; commercial set processor and CTS-500 operating system with the Cobol-11 and Dibol programming languages; and Decform and Datatrieve formatting and inquiry systems costs $90,400.

Deliveries of all Datasystem 540s are scheduled to begin in mid-1980.

Cartridge Disk Drive

The 10.4M-byte RL02 cartridge disk drive is a rack-mountable, top-loading unit that uses the dual-density IBM 5440-type disk cartridge. The drive is compatible with all PDP-11 mini systems, the PDP-11/03L and PDP-11/23-based microprocessors and the PDP-3/A systems.

The RL02 is available in a subsystem configuration consisting of disk drive and controller. The controller can support up to three additional drives. With a maximum of two controllers per CPU, the total storage capacity of a maximum RL02 configuration is more than 83M bytes, DEC said.

The RL02 subsystem costs $6,900; additional drives cost $5,600. Volume shipments of subsystems and drives are scheduled to begin this month.

IBM Drops IPO/E Policy

(Continued from Page 1)

Independent software vendors and users alike objected because other products were available for some of these same functions. Many users preferred the other products, which were expected to be upgraded by the independent vendors for the newer systems.

The policy change allows a customer using System IPO/E to replace any IBM program on the tape with a functionally equivalent non-IBM program, according to IBM.

The first official news that IBM would change its policy came in a letter to Martin Goetz, senior vice-president of Applied Data Research, Inc. (ADR). ADR put pressure on IBM in connection with its plan to offer Vollie, an online program development system, as a substitute for VSE/ICCF, the IBM program product included as part of IPO/E for this function.

The letter, signed by Ed Kane, IBM director of industry relations, merely said that IBM would agree to ship VSE System IPO/E with ICCF deleted.

The programming announcement for Release 1 of DOS/VSE System IPO/E, originally published in January 1979, was republished in September to go along with the first deliveries of IPO/E. It included the following disclaimer:

For those users who wish to "obtain the DOS/VSE System IPO/E or DOS/VSE System IPO/E functional updates without the full complement of base licensed programs or obtain separate availability of the licensed program optional features, your IBM marketing representative should be contacted for the appropriate procedures.

"The package with less than the full complement of base licensed programs will result in configurations which have not been tested by IBM and in which some functions may not be installable nor usable unless equivalent programs are substituted."

An IBM spokesman denied this represented a "change" in policy.

The program products in question have always been available singly, but not if the user wanted them on the fast-installing IPO/E tape.

ADR Returns With 'Vollie'

(Continued from Page 1)

IBM-supplied program, ADR said. To install a System IPO/E tape with Vollie, the user follows the standard IBM-supplied directions. In general, these directions involve mounting the System IPO/E tape and IPLing the computer from the tape. This brings up a "bootstrap" operating system.

The Vollie tape is then mounted and unloaded to disk. Through a series of ADR-supplied job streams, a new supervisor is generated, the computer is re-IPLed and Vollie is brought up, ADR said.

At this point, the Interactive Productivity Facility (IPF), the IBM program which installs the System IPO/E, is given control by Vollie and the customer interacts with IPF to generate his operating system and other IBM program products. Vollie serves as the host system for the interactive execution of IPF and of other IBM programs that are supplied on the System IPO/E tape, ADR said.

The user who opts for Vollie over VSE/ICCF will not do so for reasons of cost savings, according to ADR Vice-President Robert M. Coughey, but rather because the system is "easier to use, more efficient and less demanding of resources than ICCF."

Permanent licensing fee for the system is $12,300. It is also available for $445/mo and under one- to five-year lease plans, ADR said from Rte. 206, Princeton, N.J. 08540.

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On Micro Switches, Keyboards

Gold, Silver Prices Spark Honeywell Surcharge

By Tom Henkel
CW Staff

FREEPORT, Ill. — All that glitters is dulling Honeywell, Inc.'s profits.

Gold and silver — used in minute quantities as conductors in computer chips and other hardware — is getting so expensive, Honeywell says, that it is losing money on products containing those precious metals.

To offset its losses, Honeywell recently announced a precious metal surcharge on micro switches — small snap-action switches used in printers and other computer peripherals. In addition, the company is raising the OEM price of solid-state keyboards by 10%.

So far, the mainframer has been able to keep stable the cost of chips and other microcircuits that go directly into the CPU, but a spokesman in the Honeywell Micro Switch Division here said he does not know how long the company can hold off price increases on those products as well.

The decision to increase prices on some of its "bread and butter" products was an effort to keep down prices on other microcircuitry. Even with the increases, Honeywell may have to raise prices on its more sophisticated microcircuitry.

Emphasizing the "may" portion of his statement, the Honeywell spokesman said no formal decision has been made on any further price hikes.

The Micro Switch Division increase will affect OEMs more severely than Honeywell's own systems and peripherals. On those systems, the spokesman said, the increase is "negotiable" — meaning the vendor may be able to absorb the increased costs on a complete system.

For OEMs, the prices for micro switches will change every week, based on the precious Friday's closing price of gold and silver.

Feast or Famine

The effects of the surcharge have yet to be seen. The spokesman conceded the plan might turn Honeywell sales to OEMs into a feast-or-famine type of proposition.

If the week-end price of gold and silver dips, Honeywell might find itself swamped with OEM orders. If the price of previous metals jumps, the micro switch sales office might be a lonely place, the spokesman said.

"It's a very deep risk, but I don't see what else we could do, we just can't eat it anymore. Gold isn't so much the problem as is silver. Silver has tripled [since Jan. 1, 1979]. It started out at $6 a Troy ounce and now it's $18 and on its way to $20," the spokesman added.

Honeywell declined to say how much gold and silver it uses in its products.

Although the price of gold and silver has obviously turned some heads at Honeywell, other vendors do not seem as worried.

The Hewlett-Packard Co. wishes gold and silver prices were the only problems. That company is finding everything costs more — so much more that HP is making a formal study to determine what it is going to do about it.

Regardless of the results of the study, HP will announce a price increase sometime around Dec. 1, a spokesman there said, but did not elaborate.

Referring specifically to gold and silver prices, HP said higher prices for precious metals certainly have contributed to the planned price hike, but not significantly.

Like HP, Data General Corp. is also feeling the effects of inflation, although neither gold nor silver is the crux of the problem. Unlike HP, DG has not made any definite plans for a price hike, but a DG spokesman did not rule out the possibility.

For Digital Equipment Corp., silver prices are not a big concern — mainly because DEC does not use much of it. Gold is a bigger concern, but not by much.

The reason is that DEC buys most of its components from OEMs. Therefore, it is the OEM's problem and not DEC's, a spokesman said.

Apparently unscathed by higher gold and silver prices is IBM, which says it doesn't care. Spokesmen from IBM's General Systems Division and Data Processing Division both said gold and silver are used in such minute quantities that their costs really are not a factor in determining the price of hardware.

Edpaa to Host Course On Computer Auditing

MIAMI — A week-long course on "Auditing in the Contemporary Computer Environment" will be held here Nov. 26-30 by the EDP Auditors Association (Edpaa) and Coopers and Lybrand (C&L), a national accounting firm.

The course is designed for chief internal auditors, directors of management information systems and DP internal auditors.

The course will be held at the Carillon Hotel. Registration costs $525 for Edpaa members or $575 for nonmembers. More information is available from Leonard Gilbert at C&L, One S.E. Third Ave., Miami, Fla. 33131.

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Capability, Speed of Translation System Boosted

By Don Leavitt
CW Staff

LA JOLLA, Calif. — A minicomputer-based translation system called "revolutionary" when it was introduced a year ago has been dramatically boosted in both language capability and processing speed.

Based on the Digital Equipment Corp. PDP-11/34 processor with DEC's RSX-11M operating system, the original Multilingual Word Processing System from Weidner Communications Systems, Inc. could translate Spanish into English at a rate of 600 word/hour. That was the system that Thomas R. Bauman, president of the American Translators Association, hailed as revolutionary.

Now, in addition to an English-to-Spanish facility introduced earlier this year, the Weidner system has been extended to handle English-to-French translation and to do its work at a rate of 24,000- to 28,000 word/hour.

A French-to-English capability is a definite possibility and Weidner's president, J. Brent Haymond, said his firm projects an 11-language capability for the system "within the next few years." An important feature of the system is that it can be programmed to include technical language, he added.

Idioms Managed

Although input can be keyed into the system, interfaces to Wang Laboratories, Inc. word processing units have been developed to provide more rapid input and to allow a more polished representation of the translated output, according to Weidner Vice-President Rick Farr. A 256K-byte PDP-11/34 can handle four separate translating operations simultaneously, each managing idioms as well as simple phrasing in both the original and the translated text, he said.

Although it considers context, the system encourages the human translator to monitor and, if necessary, change any work done by the system. This is a recognition of the fact that there are words and phrases that may have different translations, Farr said.

To help the translator, the system displays on a CRT screen eight lines of original text and eight lines of translated text. The translator can mark any translated word with the cursor, then touch a function key; the system then shows at the bottom of the screen a list of alternatives to the marked word. The translator can insert the appropriate word into the output text and then release the system to continue its work.

Officials from the company reported they are already working on translation capabilities in Arabic, German, Portuguese and "several other languages." At least some of these are expected within a year or so.

The system is currently being marketed primarily as a turnkey system that includes the DEC hardware and the Weidner software, but the software could be used on almost any installed PDP-11/34 with the addition of one special circuit board, Farr indicated.

As a turnkey, the system costs $155,000 for the first translation capability, an additional $50,000 for the second and then another $25,000 for each translation facility thereafter. Spanish-English and English-Spanish, for example, are two separate capabilities, the spokesman noted.

Weidner is at Suite 100-A, 3366 N. Torrey Pines Court, La Jolla, Calif. 92037.

Following GAO Report

House Scrutinizing Justice's DP Purchases

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Already beleaguered by the Senate Judiciary Committee for its operation of the Federal Bureau of Investigation's National Crime Information Center (NCIC), the Justice Department now faces intensified scrutiny by the House Government Information and Individual Rights Subcommittee.

After the recent completion of a General Accounting Office (GAO) report on the NCIC, the House panel said it plans to step up oversight activities regarding FBI and Immigration and Naturalization Service (INS) DP procurements and operations.

The GAO study was commissioned by subcommittee chairman Richardson Preyer (D.-N.C.), who told his colleagues the GAO found "the FBI has paid too little attention to the public purse, the public's rights or even principles of sound management and planning."

In a statement delivered Nov. 2, Preyer said his subcommittee has become "increasingly aware of and concerned about the applications and use of computer communications networks by federal government agencies.

"Development and implementation of these systems often occur with no serious attention being given to real costs and benefits; with inadequate planning for the needs of those who will actually use the system; with no concern for the interest of state and local governments when they may be users of the system or its products; and finally, where personal information flows through the system, with disturbingly little respect for the rights and interests of our citizens," Preyer said.

Two Records Systems

The GAO investigation focused on two NCIC automated records systems: the Computerized Criminal History (CCH) system and the Automated Identification Division System (Aids). The CCH program has also been the subject of continuing oversight by the Senate Judiciary Committee [CW, May 28, Aug. 13].

The GAO said development of a centralized CCH system has been hindered by unresolved issues of the desirability for the FBI to provide message-switching services for the system, indecision regarding the future operational aspects of the program and the impact on privacy and related rights.

Similarly, the Aids system, a criminal information and fingerprint file, was found to be plagued by "developmental delays, underestimated costs and changes in plans due to unworkable ideas," the GAO reported.

Backed with this information and the results of recent hearings on INS automation, which revealed lack of long-range DP planning and unauthorized minicomputer procurements, the Preyer subcommittee has been looking into overall Justice Department DP management and practices.

The panel is concerned that "the NCIC problem is just a reflection of a much larger problem with the whole question of how the Justice Department deals with computer communications capabilities," according to subcommittee counsel Christopher Vizas.

Pressure on INS

Charges that INS automation has been carried out without proper planning and without government procurement authorization led House Government Operations Committee chairman Rep. Jack Brooks (D-Texas) to ask the General Services Administration to cut off INS procurement delegations [CW, Aug. 6].

Vizas said "INS really has to clean up its act in terms of how it runs its records systems and filing systems before it goes into the business of automating the systems. It's got to figure out how to do it administratively — walk before it runs."

INS has run into "an intriguing problem of making sound policy in a situation where there's a lot of pressure being placed politically on INS to do certain things that they probably aren't ready to do. And they've gotten themselves into trouble," Vizas added.

Basic Problems

Feeling the INS and FBI controversies stem from similar problems, the subcommittee is looking into the possibility that the Justice Department is "having basic problems with procurement strategy, how it plans and how effective its procurement of data communications capabilities are," he said.

Stressing that the concern goes deeper than the privacy and federalism issues raised by NCIC message-switching proposals, Vizas said that "absent any value choices about what sorts of systems you have, you at least have to have proper planning and proper identification of who the users are and why they need it before you can begin to procure equipment and even plan a system.

"So far, from what we've seen, that doesn't seem to be the method by which the FBI's been moving."

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After Government, Industry Warnings

Model Confirms U.S. Economic Downturn

By Jeffry Beeler
CW West Coast Bureau

LOS ANGELES – Government economists have predicted it. Private industry has warned of it. And now a computer modeling experiment here has confirmed it: The U.S. is sliding slowly but inexorably into recession.

In fact, the much-discussed economic downturn has probably already arrived, according to Peter Jaquette, a research associate at the University of California at Los Angeles (UCLA).

However, the current recession should last only through the middle of next year and will prove "much less severe" than its 1974-75 predecessor, Jaquette said.

Jaquette bases his opinion on the latest projections of a computer model developed 11 years ago by Dr. Lawrence Kimbell, an associate professor at UCLA's Graduate School of Management.

Every three months, Kimbell and his associates try to forecast the nation's economic future by supplying their model with the most current business figures available, including labor statistics and pricing data.

The model first looks back into recent history to find out how selected economic actions have affected U.S. business in the past. Using historical trends as a guide, the model then extrapolates current economic data to form a picture of the U.S.' short- and long-term business future.

Using historical trends as a guide, the model then extrapolates current economic data to form a picture of the U.S.' short- and long-term business future.

Interim Forecast

After its last regular forecast in September, the model was not scheduled to make its next stab at economic stargazing until December. But when the Federal Reserve System last month announced a sharp boost in interest rates, Kimbell and his associates decided to do an interim projection to calculate the probable impact of the Fed's actions.

The interim forecast reportedly yielded several findings:

- Despite government assurances to the contrary, the U.S. entered a recession earlier this year, probably during the second quarter.
- The Fed's latest inflation-fighting measures will make homeowner loans difficult to obtain, discourage housing starts and trigger layoffs in the construction industry.
- Although the expected downturn in the construction industry will prove milder than in 1974-75, it will still produce enough of a financial splash to send ripples of reaction throughout much of the U.S. economy.

Raw Statistics

Most of the raw data used in the UCLA model's projections comes from federal agencies like the Department of Commerce, the Bureau of Labor Statistics and the Federal Reserve Bureau, which supply figures on employment, prices, money supply, interest rates and other items of economic interest.

The data is stored and updated daily in two time-sharing systems operated by Data Resources, Inc. (DRI) of Lexington, Mass., and General Electric Co.'s Information Services Division in Rockville, Md.

DRI's system incorporates a 1.5M-word Burroughs Corp. B7700 running under the MCS operating system, while the GE system is built around both IBM 3033 and Honeywell, Inc. Level 66 DPS models.

Kimbell and his staff gain access to the two time-sharing systems through three remote workstations here, including a Qume Corp. Sprint 5, a Hazeltine Corp. 1500 and a Hazeltine 1510.

After all the necessary raw statistics are fed into the model, they are used by the two time-sharing processors to solve a set of more than 500 simultaneous equations from which the researchers here derive the figures for their economic forecasts, Kimbell said.

When working with relatively small data files, the researchers produce their forecasts locally with two North Star Computers, Inc. Horizon systems, which operate as intelligent terminals.

The model's finished output is presented in 23 tables of statistics, which describe changes in economic circumstances like housing starts, unemployment, consumption, industrial investment and gross national product.

Berger Elected Asis President

WASHINGTON, D.C. – The American Society for Information Science (Asis) has elected Mary C. Berger president for a one-year term beginning October 1980.

Berger is a senior staff member of Cuadra Associates, Inc. of San Monica, Calif., where she develops and conducts the company's seminars on on-line data bases and on-line searching.

Elected as councilors-at-large for a 1980-1982 term were Edmond J. Sawyer and Julie Carroll Virgo.

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DPers Highly Mobile

FRAMINGHAM, Mass. — As many as 80% of most computer professionals would change jobs if the opportunity arose, even with the threat of an impending recession, recent survey results showed.

Professionals in the computer and communications fields indicated that 12% of the respondents are "actively" engaged in finding a new job, 17% are "inactively" seeking new employment and 51% "would consider" a new position. Only 20% indicated they were content with their present jobs and "would not consider" a new position.

The survey results seemed to indicate that fear of a recession has not stopped DPers from maintaining their high job mobility rate, according to Robert Brown, president of Conec Company, Inc., the personnel search and placement consulting firm that conducted the survey.

Conec is planning to conduct a more comprehensive survey in the spring, which will chart the mobility trends among computer professionals.

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Multimegabit Transmission Rates, User-Designed Nets Predicted

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Multimegabit transmission rates and more user-designed networks are two likely data communications developments during the next five years, according to James Wood, a senior associate at Booz, Allen and Hamilton, Inc. Wood spoke at a technical session of the Federal Computer Conference held here recently.

Both trends are being driven by the business community's growing use of on-line computer systems and by the increasing commercial availability of components which users can fashion into systems that accommodate their particular needs, Wood said.

Quoting Charles Lecht, a widely published writer on industry trends, Wood said that 87% of all systems installed are expected to have communications capability by 1985.

Growing Market

Earlier at this same session, William R. Nugent, head of systems engineering and operations at the Library of Congress pointed out that 1979 will be the first year in which U.S. expenditures for data communications equal those for data processing.

AT&T predicts that the data communications market will grow 15% annually, compounded during the next five years, and will be worth $2.2 billion by 1985, Nugent reported.

Four million data terminals are now installed in the U.S., and they are expected to double during the next five years.

Meanwhile, satellite technology has produced a tenfold drop in monthly circuit costs since 1975, and the distance at which rates for satellite circuits become competitive with those for terrestrial facilities has declined from 1,000 miles to 500 or 600 miles.

Existing Facilities

Wood said that at least some of the multimegabit transmission facilities to be utilized during the coming five years are already in place, and the others are past the talking stage.

He cited AT&T's existing Digital Data Service (DDS), which operates at 1.3M bit/sec, and the planned Satellite Business Systems (SBS) network, which will transmit at 6M bit/sec.

Existing leased satellite circuits can operate at up to 45M bit/sec, microwave at 90M bit/sec and T-carrier at 270M bit/sec, he added.

Wood admitted that applications for multimegabit transmission capacity have not fully developed yet, but he said they would emerge as a result of the "turnpike effect": The new facilities, once they are in place, will attract uses and users, with a little help from vendors. SBS, for example, is already heavily engaged in a missionary marketing effort.

Meanwhile, the conversion of analog voice signals into digital bit streams at or near the sender's telephone is becoming increasingly cost-effective, and this trend should add directly to the need for multimegabit channels.

Two Factors

Aside from demand, Wood said future use of these facilities will be affected by two other factors.

One is how quickly network operating systems are developed that can automate the present largely manual process of controlling and allocating network resources.

The other factor is the availability of optical bandwidth processors. These could increase the information-carrying capacity of fiber optic circuit links from the present level — approximately 45M bit/sec — to "hundreds of millions of bits per second."

Local Area Nets

Also speaking at the conference, Dr. Ira W. Cotton of the National Bureau of Standards predicted that "local area networks" will become popular in the 1980s — partly because they are an "essential ingredient" of office automation, partly because they enable the user to obtain performance not offered by the communications carriers.

Local area networks generally serve terminals no more than 2 kilometers apart, Cotton explained. Typically, they are within office buildings or research and industrial complexes.

It is now possible to construct local area networks that transmit shared, dynamically allocatable bandwidths of more than 1M bit/sec, Cotton said. Error rates are as low as $1:10^{12}$ — i.e., one per trillion characters — or less. The cost of such facilities is below $1,000 per network connection, "with future cost declines anticipated" as the price of logic continues to drop.

Use of sophisticated access schemes — in which stations contend for channels but employ special procedures to minimize interfering with each other's transmissions — "yields utilization in excess of 90% of channel capacity," Cotton said.

Although a number of local area networks are operating today, they have all been developed by the users. Cotton expects commercial vendors to be marketing turnkey systems "in the not-too-distant future."

One-Day Course to Offer Telecommunications Guide

WASHINGTON, D.C. — If you've ever wondered how to search through the maze of government agencies in search of telecommunications information, Information Gatekeepers, Inc. is offering a one-day course to tell you how.

Scheduled for Dec. 14 at the Embassy Row Hotel here, the course will teach you what information is available, where you can find it and how to use it once you've got it, Information Gatekeepers said.

The course offers a guide to using government information to develop marketing strategies and to collect information on pending regulations.

The course costs $250, Information Gatekeepers said from Suite 111, 167 Corey Road, Brookline, Mass. 02146.

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'Classic Customer-Vendor Dispute'

Faulty System Ignites Finger-Pointing War

By Jeffry Beeler
CW West Coast Bureau

SAN JOSE, Calif. — Only about four months after its installation, a trouble-ridden accounting system faces possible removal as part of what one source here calls "a classic customer-vendor dispute."

Neither the client nor its supplier denies that the $2.6 million system has been prone to breakdowns, lacked adequate disk space or thrown its user badly behind schedule in producing key financial reports. But on the thorny issue of who bears the blame for the system's many ills, the two sides quickly part company, with each waging a silent war of finger pointing.

The user, Santa Clara County, places most of the onus on the vendor for its alleged failure to provide adequate customer support or to follow the project through to its completion. In protest, the county has withheld the last 10% of the supplier's $1.3 million fee and has discussed the possibility of filing suit against the company for nonfulfillment of contract.

Some county officials have even threatened to scrap the new system and revert to its less advanced predecessor, known as the Accounting Resource Management System.

On the other side of the conflict, the vendor — American Management Systems, Inc. (AMS) — dismisses the charges against it as "outrageous" and ascribes the installation problems instead to shortcomings in the county's computing expertise and to the refusal of its DP staff to participate fully in the system's development.

AMS — an Arlington, Va.-based systems builder and software house — defends its system's performance. Although it acknowledges the presence of some software "bugs," it describes them as "minor" and typical of the sort of problems that arise in almost every large-scale system's implementation.

Subject of Dispute

The subject of the controversy is AMS's Comprehensive Budget and Management Information System (CBMIS), which for the first time integrates all the county's accounting files in one central data base supported by dual 2.5M-byte IBM 370/158s.

In theory, CBMIS gives each user department unprecedented control over its financial information by permitting decentralized data entry and inquiry through some 50 on-line Raytheon Co. PTS 100 terminals situated throughout the county.

In practice, however, the system has often fallen woefully short of its advertised capabilities, according to county DP manager Jerry Hall.

Since CBMIS' installation on July 1, downtime in computing operations here has averaged an estimated 20%, and the county has slipped at least a month behind its schedule in preparing financial and management-information reports for its users, Hall complained.

Space Shortages

Much of the blame for the overdue reports, the DP manager claimed, stems from AMS' failure to configure its system with adequate disk-file space.

With disturbing frequency, he said, the county's accounting programs are failing because the system's disk spaces are sometimes too small to hold unusually large files or tables.

When such a failure occurs, CBMIS automatically shuts down, and programmers have to be summoned to pinpoint the problem, reconstruct the oversized file from scratch and assign it to a larger space in disk memory. By the time programmers can untangle the snag and restore operations, the 370/158s have often lost as much as eight hours of processing time, Hall said.

To make up its lost CPU time, which is considerable, the county has had to cut back repeatedly on its report-writing effort — which explains why Hall and his staff now find themselves so far behind in their reporting schedule.

Software Bugs

Hall also criticizes AMS for allegedly neglecting to test all parts of its software and for withholding selected test results.

The company's failure to debug its programs thoroughly, he charged, has resulted in four-week and year-end reports that "make no sense" and required modifications by the vendor.

Hall also accused AMS of skimping on the county DP department's formal training and of "systematically refusing" to let his staff learn how to use CBMIS while it was being installed.

Response to Charges

Responding to the county's charges, AMS' western regional vice-president, Richard Witschonke, partly confirmed the claim that his company prevented Hall's staff from studying the system during its implementation. But the action was justified, he said, because the county had insisted its DP staffers be reimbursed by the vendor for the time they spent in training.

As for the county's complaints about untested software, AMS executive vice-president Jan Lodal disputed claims that his firm overlooked some tests altogether, but he did agree that parts of the system probably received less debugging than they deserved.

Lodal blamed the shortcoming, hoever, not on any AMS oversight, but on the county's failure to supply data and interface programs the firm needed to perform the tests.

Lodal also challenged the county's explanation of its disk-space shortage. The problem arose, he said, partly because the county is now processing a considerably larger transaction volume than it specified in its original contract with AMS.

The space shortage also developed, Lodal added, because the county has fallen behind in purging outdated accounting information from its disk files. If the county removed all the extraneous data, its shortage of file space would ease considerably, he contended.

Journal Covers Computer Law

NEWARK, N.J. — The *Rutgers Journal of Computers, Technology and the Law* deals with issues arising from the interaction of computers and other technologies with the law, according to the publishers.

Formerly know as the *Rutgers Journal of Computers and the Law*, the publication presents scholarly articles by commentators and jurists, as well as book reviews and an annual bibliography of legal source materials in the area of computer law.

In addition, the journal will now deal with other technological topics, including contracting for hardware, software and services; antitrust problems and government regulations; and sales and property taxation of hardware and software.

Other new topics include copyright, patent and trade secret protection of software; privacy and data banks; liability for computer error; and computer output as evidence in courts.

Telecommunications and emerging information technologies as well as electronic funds transfer systems will also be treated in the journal.

Published semiannually, the journal costs $20 in the U.S. and Canada and $21 for foreign subscriptions. Checks should be made payable to *Rutgers Journal of Computers, Technology and the Law* and should be sent to Rutgers Law School, 15 Washington St., Newark, N.J. 07102.

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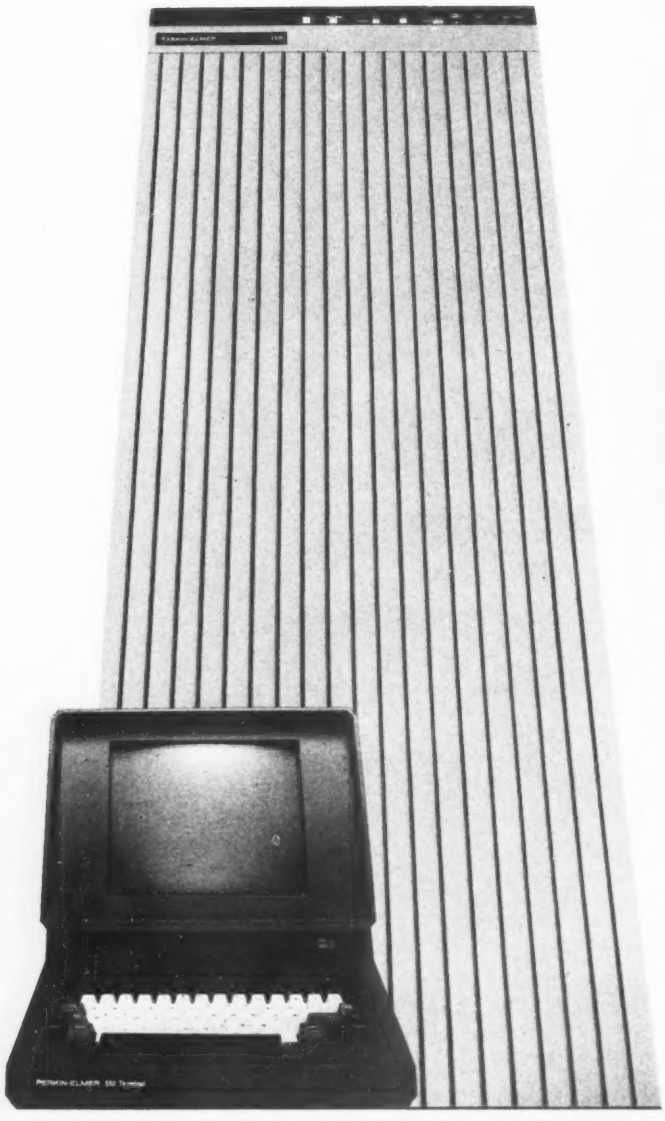

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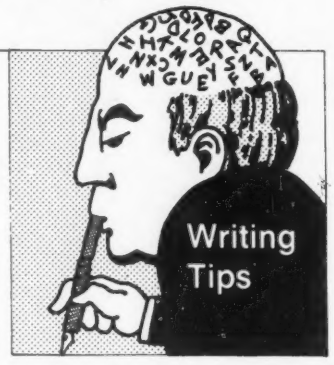

This is the eighth in series of 12 articles on better writing.

A would-be Julia Child knows how to use spices to convert ordinary dishes into gourmet fare. A sprinkle of wine or a dash of soy sauce, and ordinary chicken becomes coq au vin or oriental chicken. The essential shape and texture of the chicken remains the same, but the flavor has changed altogether.

A regular diet of typical subject-verb simple sentences is as boring as a nightly dinner of broiled chicken. The following paragraph illustrates the effect of a succession of subject-verb sentences:

Example: The XYZ Co. announces the addition of a 1980 series computer to its line. The 1980 series will be ready for delivery in January, 1980. The 1980 series is 50% faster and 10% cheaper than its predecessors. The 1970 series is being phased out. All orders placed before November will be honored by March, 1980. The capabilities of the 1980 series will be described at the official announcement at company headquarters on Oct. 1.

Writers can make their sentences more vigorous by varying the sentences in length and in structure. Within a memo or article, writers should usually include simple, compound and complex sentences of different lengths.

For example, writers can build compound sentences out of two or more simple sentences (1) through the use of a comma and "and," "but," "or," "nor," or "for"; (2) through the use of a semicolon; or (3) through the use of a semicolon and a conjunction such as "however" or "nevertheless":

Example 2: The 1980 series will be ready for delivery by January 1980 and all orders placed before November 1979 will be honored by March 1980.

Example 3: The 1980 series will be ready for delivery by January 1980; all orders placed before November 1979 will be honored by March 1980.

Example 4: The 1980 series will be ready for delivery by January 1980; moreover, all orders placed before November 1979 will be honored by March 1980.

However, a succession of compound sentences is as offensive to the senses as the overuse of pepper or garlic.

Writers can also achieve sentence variety by using complex sentences — sentences with subordinate clauses. The three types of subordinate clauses are noun, adjective and adverb clauses.

Example 5: The programmer hoped for a raise.

A. Noun clauses:
1. As subject: That she would get a raise was the programmer's greatest hope.
2. As direct object: The programmer hoped that she would get a raise.
B. Adjective Clauses:
The programmer, whose salary review was scheduled in two months, hoped for a raise.
C. Adverb Clause:
1. Causal: Because the programmer was hoping for a raise, she did not look for a new job.
2. Conditional: Although she was hoping for a raise, her review was postponed for two months.

Sometimes writers use one- or two-word modifiers to vary sentence beginnings. These modifiers rarely change the structure of the sentence which follows:

Example 6: Adjective: Apprehensive, the guard crept into the smoke-filled computer room.

Example 7: Adverb: Cautionsly, the guard entered the smoke-filled computer room.

When an adjective or adverb precedes the rest of the sentence, it receives more emphasis than it ordinarily would receive.

Longer modifying phrases are effective — if they are used correctly. Writers should place these modifiers close to the word modified, and they should make sure that the sentence has both a subject and a verb:

Example 8: We improved our turnaround time.
A. Prepositional phrase: By the purchase of additional memory, we improved our turnaround time.
B. Participle phrase: Having purchased additional memory, we were able to imporve our turnaround time.
C. Infinitive phrase: To improve our turnaround time, we purchased additional memory.

In the revised paragraph which follows are several of the types of sentences described above:

On Oct. 1, 1980, at its corporate headquarters, the XYZ Co. will officially announce and describe the capabilities of its 1980 series. Fifty percent faster and 10% cheaper than the soon-to-be-phased-out 1970 series, the 1980 series will be ready for delivery in January 1980. Companies that place their orders before November 1979 will receive their 1980 series computers by March 1980.

Clearly, when writers vary sentence length and structure, they produce articles which are more terse, more cohesive and more interesting. The preceding paragraph, for example, consists of three tightly constructed sentences, while the original paragraph consists of five loosely constructed sentences.

However, writers should note that too much sentence variety (elegant variation) is as cloying as too much seasoning. In fact, the real taste of the food is masked.

Winett teaches "Essentials of Writting" at Framingham (Mass.) State College.

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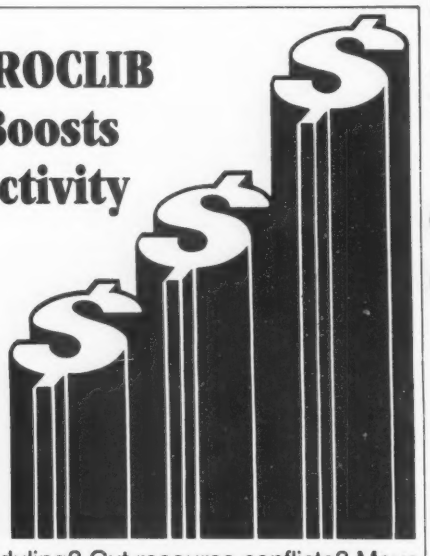

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Congressman Asks Probe Of EDS Medicare Backlog

CW Washington Bureau

WASHINGTON, D.C. — Charging that Electronic Data Systems Corp. (EDS) is drowning in a rapidly growing sea of unprocessed Medicare claims in Illinois, Rep. Paul Simon (D-Ill.) has asked the General Accounting Office to find out why.

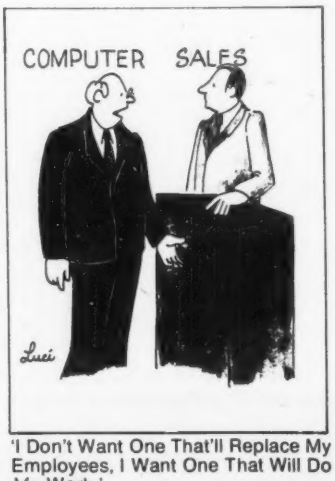
Simon also requested a subcommittee of the House Government Operations Committee to investigate. The subcommittee, headed by Rep. L.H. Fountain (D-N.C.), concluded a lengthy investigation of EDS Medicare claims processing operations in 1971 and 1972.

According to Simon, the company's subsidiary, Electronic Data Systems Federal (EDSF), had an unprocessed backlog of 450,000 Illinois Medicare claims as of Oct. 1. The backlog is increasing at a rate of 4,000 to 5,000 claims a week, he added.

By comparison, when EDSF took over the processing job earlier this year, there was a backlog of 65,000 claims from the Chicago area and 10,000 from the rest of the state.

Asked to comment, EDS said, "The issues that Congressman Simon is discussing are points we feel are in the past. It's normal to have a backlog during a transition such as this.

"We're currently processing more claims than we're receiving and expect to reduce the backlog to an acceptable level prior to the end of the year."



'I Don't Want One That'll Replace My Employees, I Want One That Will Do My Work.'

But Also Suggests Some Changes

ABA Embraces Tentative Decision in Inquiry II

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The American Bankers Association (ABA) is "greatly impressed" with the tentative decision of the Federal Communication Commission (FCC) in the second Computer Inquiry. In comments recently submitted to the commission, the bankers called the decision "a creative regulatory solution to the difficult problems raised by the blurring of traditional distinctions between communications and data processing."

Despite this praise, the ABA recommended some changes.

Specifically, the association wants the final decision to state clearly that firms offering "communications-based, processing-type" services will not be regulated unless they also offer voice or nonvoice services like those long subject to government control. (The FCC's tentative decision refers to these as "basic voice or nonvoice services.")

The ABA also questioned whether requiring wholly separate subsidiaries will assure against cross-subsidization. "We believe the commission should pursue the possibility of designing accounting systems" capable of identifying "improper subsidiary or parent activities," the association said.

It added that the FCC should "maintain regulatory oversight procedures which will allow swift commission action in the event of improper interference in nonregulated markets by such subsidiaries or parents."

ABA, Adapso Stands Differ

A major difference between the ABA's position in the Computer Inquiry and that of the DP industry relates to separate subsidiaries. The bankers would rely primarily on separate accounts to prevent anticompetitive cross-subsidies.

However, the Association of Data Processing Service Organizations (Adapso), in its earlier comment on the tentative decision, argued that "effective accounting and auditing procedures . . . do not obviate the need for maximum separation. To begin with, such procedures cannot . . . affirmatively promote competition.

"Equally important . . . such procedures are incapable of addressing, much less limiting . . . anticompetitive abuses unrelated to the proper allocation of funds, such as those concerning access to, or the quality of, telecommunications facilities.

"In addition . . . even the best accounting system is limited by the quality of the data which it reflects. When dealing with the complex corporate structure of a vertically integrated carrier, the identification and proper attribution of expenses on a cost-causative basis is extremely difficult and at some point becomes arbitrary."

Consent Decree Issue

ABA's view of the ATT Consent Decree also differs markedly from that of major DP industry groups. The bankers believe that "while the Consent Decree will at some point be required to be addressed, we welcome a commission decision which authorizes increased competition in the interim."

DP industry groups, by comparison, argue that this increased competition — at least in unregulated markets like DP services — cannot be legally authorized as long as the Consent Decree remains in effect in its present form.

"Even if the commission, with the Department of Justice, should seek modification of the decree before a court of competent jurisdiction, there is a high risk . . . that a modification lacking rigorously defined separation of competitive activities would be contested and subsequently rejected," the Computer & Communications Industry Association maintained.

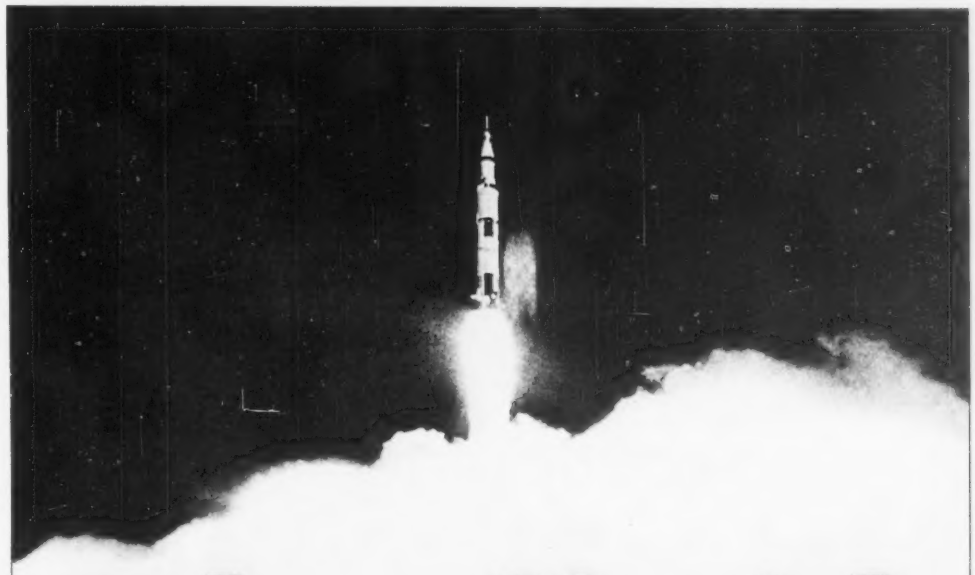
Data Base Meet To Start Dec. 10

LOS ANGELES — Data administrators, data base designers and programmers, systems analysts and managers of information systems projects are invited to a conference on the entity-relationship approach to systems analysis and design here next month.

Sponsored by the University of California at Los Angeles (UCLA) Graduate School of Management in cooperation with the Association for Computing Machinery's Special Interest Groups in Business Data Processing, Information Retrieval and Management of Data, the conference will be held on campus Dec. 10-12

The first day of the meeting will be devoted to tutorial sessions. The second and third days will be turned over to the presentation of papers on such topics as requirements analysis and definitions, data base analysis and design, languages and data base systems based on the concepts of entities and relations, distributed data bases, new theories and tools and case studies.

Information on registration, hotel accommodations and proceedings is available from the Office of Executive Programs, Graduate School of Management, UCLA, Los Angeles Calif. 90024.



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IBM's Technical Rank Debated in Antitrust Suit

By Connie Winkler
CW Staff

NEW YORK — IBM argues it achieved its premier DP position because of its technological "skill, foresight and industry," particularly in semiconductor technology.

And the Justice Department, which has brought IBM to trial on antitrust charges, says IBM lags behind in technological developments, only enhances technologies others introduce and succeeds only because it invests huge amounts of capital to solve technology problems. Right in the middle of this dispute for the last month of the U.S. vs. IBM antitrust trial was IBM witness Erich Bloch, general manager of IBM's East Fishkill, N.Y., semiconductor plant and development lab.

Contract With TI

IBM is the first to use the 64K memory chip in any announced products, Bloch testified. However, Justice Department Attorney John H. Chapman tried to undercut the intensity of that claim.

Chapman introduced documents showing that, at about the same time IBM announced the 4300 series of mainframes, it extended a contract with Texas Instruments, Inc. for other memory technologies.

In 1977, IBM initially contracted with TI for "technical information" on 64K charge-coupled devices, 16K random-access memory and 16K erasable programmable read-only memory technologies. The latter two double-polysilicon gate technologies compare with the older metal gate technology of IBM's 64K memories.

Bloch said the double-polysilicon agreement with TI was "a way of expediting in a manufacturing sense the learning for double polysilicon. East Fishkill did not have any experience with double polysilicon."

Design System

The Engineering Design and Release System (EDRS) is IBM's automated design system, which uses terminals "to coordinate the entire process of component, packaging and end-product design and manufacturing to enable the end-product designers to make trade-offs between component technology, machine design and system architecture," Bloch said.

The annual cost for EDRS is about $20 million, with most of that for software development, Bloch added. EDRS is just one of the sophisticated tools that Bloch pointed to as putting IBM at the forefront of semiconductor technology.

Another is electron beam or E-beam machinery, which focuses electrons to create patterns on the silicon wafers, thus allowing different circuits to be easily personalized on each wafer.

Much of Bloch's cross-examination was "in camera" — behind closed doors, — because it involved unannounced IBM products. During that questioning, Chapman introduced documents that showed IBM's first E-beam was know as Aspra. The successive models through 1985 are called Poca and Hontas.

IBM now has a $200 million contract with the U.S. Department of Defense (DOD) to build an E-beam with the capability of Hontas — a two-micron beam. Chapman suggested IBM's purpose in going after the DOD contract was to enhance its Hontas.

Bloch countered: "We had something to offer in terms of where we are with regard to the state of the art in photolithography, and I thought we could learn a lot that, later on, would be helpful to IBM."

Aspra was part of the advanced manufacturing capability IBM planned to build into its Future System (FS) in the mid-1970s, and it was all called Future Manufacturing System (FMS). In 1975, however, FMS was "redirected," Bloch testified.

Chapman introduced an internal memo Bloch wrote in 1977 describing FS as a "fiasco." On the stand, Bloch disagreed with the use of that word.

"If I used the word at one time . . . and then indicated to you it was not fiasco, what I mant to say was that benefits out of the FS program came about because a lot of work, especially in the components area, was carried over and is carried over today," Bloch testified.

All aspects of FS development were part of the Stanford University project. That included what was announced in the 4341, the Samos 64K memory chip and Purdue logic circuits.

Bloch estimated IBM spent $50 million gearing up the Samos production line at the General Technology Division in Burlington, Vt.

Vendor Decisions

Chapman also questioned Bloch on vendor decisions. One IBM memo showed that IBM could have saved $3.4 million if it had transferred a certain semiconductor contract to another firm.

Bloch said he looked at the vendor decision from an "out-of-pocket" position — how much IBM would have to pay out of its coffers to another firm.

Later, on redirect examination, Bloch said "out of pocket" was a decision-making concept, not an accounting one, and that all products bore their full costs.

More so than other IBM witnesses, Bloch did cement some key bricks in IBM's defense:

- As memory technologies have moved from one period to the next — for example, transistors to semiconductors — cost decreased and performance and reliability improved.
- The semiconductor industry, which includes IBM, is encountering more and more competition from Japanese firms such as Hitachi, Ltd. and Fujitsu. This is one of the first times references to the Japanese influence, which IBM considers important, have been allowed in the case.
- As more and more of the computer is put on a single chip, computer development and production must work close together. Bloch called this concept "linkage," which is illustrated by semiconductor firms moving into the micro computer and minicomputer business.

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Speeds Analysis Processing

RIB Helps Reconcile Couples

By Jay Woodruff
CW Staff

DES MOINES, Iowa — Computers are being used to help couples across the country determine how well they communicate with each other and what they can do to improve their relationships.

Developed and run here, the system is used by marriage counselors, clergy and analysts. Called the Relationship Intimacy Barometer (RIB), it is based on a complex analysis system called the Marriage Climate Analysis (MCA), offered by GMI, Ltd. [CW, Aug. 29, 1977].

The MCA system — which is still available, but requires a "fairly sophisticated clinician" to interpret it — was revised by GMI into the RIB system to allow those counselors without extensive interpretive training to supervise and aid couples trying to revamp their relationships.

Cost is less, too, reduced from $50 to $10, and more than 1,500 couples have used it since it became available late this summer, according to GMI President Dr. Charles Cleveland.

RIB is a set of computer programs written in Fortran and Pascal, which processes formatting instructions and the couples' responses to situations posed to them in a booklet.

The work is processed on Control Data Corp. CDC 6000 or Cyber mainframes. GMI returns the results, attached to a workbook, to the counselor and the couple, Cleveland indicated.

The computer greatly improves the accuracy and rapidity with which the questions and responses can be processed, compared with manual methods, according to GMI Vice-President R.J. McDonald. About one million combinations of analyses can be drawn from a couple's responses, McDonald, a marriage counselor, said.

The RIB booklet, now available only through counselors and counseling services, is filled out separately by each partner. The booklet consists of 10 situations in which a couple might find itself involved and asks each person to rank seven responses — from most comfortable to most uncomfortable — that he or she might make to that situation.

After the filled-out answers have been sent to GMI and processed on the CDC systems, an analysis is printed, then folded and stapled to a workbook, which is then returned to the counselor.

The couple is directed to work through the workbook exercises, in which each partner defines who he thinks he is in relationship to the other.

The couple can then examine the analysis printout, which evaluates the relationship based on the previous responses to the posed situations. Once the couple has made this comparison, they continue through the workbook to set goals of "what we want to become," McDonald explained.

"The printout says things to a couple that an analyst might not be willing to tell them," Cleveland observed. "They can get mad at the computer for what it says, but they can't personalize their reaction."

The biggest advantage of the system, he said, is its speed and accuracy. "It allows counselors to evaluate couples in a very short period of time. It shows where there is an imbalance in the relationship and what they can do about it."

Advertisement

DP Dialogue

Notes and observations from the IBM Data Processing Division that may prove of interest to DP professionals

Containerized freight is transferred from a Burlington Northern Air Freight truck to a jet aircraft. The company speeds administrative messages with its IBM computer network.

Communication Gets FERST Priority at Burlington Northern

"Three programmers implemented our nationwide online message-switching system in 3 months, using FERST/VS," says Timothy L. Cherney, director of data processing for Burlington Northern Air Freight, Inc.

The Freight and Equipment Reporting System for Transportation/Virtual Storage (FERST/VS) is an IBM program product. To support its air freight operations, the Burlington Northern, Inc. subsidiary adopted one module of FERST/VS, called Message Switching, installing it in an IBM System/370 Model 148.

To speed shipments to customers, the Newport Beach, California-based company transmits a steady stream of administrative information around the world among its 86 offices. Today, the computer serves as a switch through which all this traffic flows. It queues the messages, stores them, and then forwards each as the destination terminal becomes available.

When an inquiry is not immediately resolved, the system automatically keeps track of it and periodically transmits reminders to the responsible station. A copy of each message is retained in memory and can be recalled at any time within 120 hours, or all traffic for that five-day interval can be reproduced. And, Cherney says, there has been a significant gain in speed of communication because of the computer's fast transmission rates and the efficiency of SDLC.

"The tracing function," Cherney adds, "which allows an operator at a terminal to ask the system for the present location of any shipment, was developed during our first year. By the time the system is two years old we will have total airbill entry, dramatically reducing the amount of paper required to move freight."

Burlington Northern's worldwide network was built using IBM's System Network Architecture (SNA). "With SNA," Cherney points out, "we are able to put the most appropriate device at each location without incurring additional line costs or rewriting our software. SNA gives us the flexibility to respond rapidly to technological advancements that fit the business needs of our company."

SNA Helps Trane Keep Its COOL

"We have 180 IBM 3767 Communication Terminals across the country for online order entry. Using SNA, we were able to put another 100 devices of different types on the same network, for other applications: remote job entry terminals, visual display stations, and the like."

Gordon Searle is describing the use of Systems Network Architecture (SNA) as the basis for the Computerized Order On Line (COOL) system at The Trane Company. Searle is director of corporate data processing for Trane, a major manufacturer of central air-conditioning systems.

Minutes, Not Days

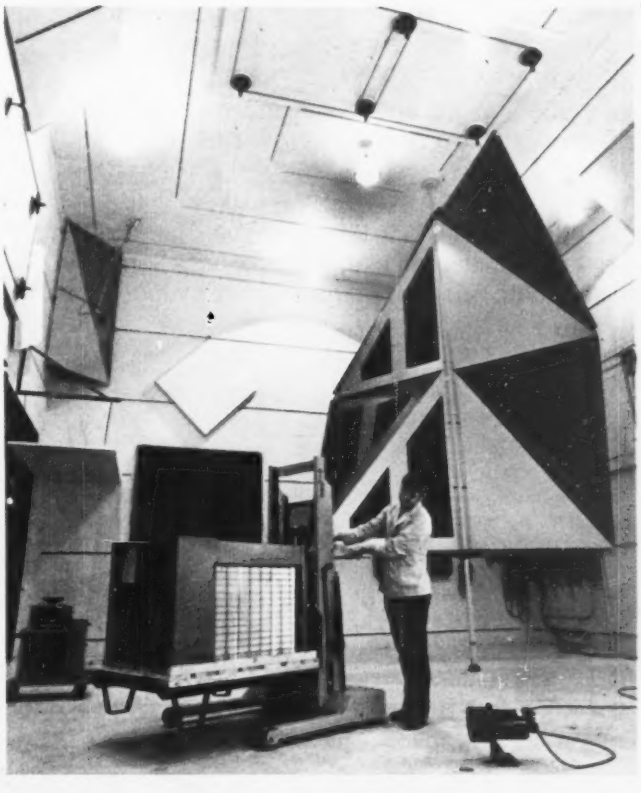
"Today a customer order is accepted and forwarded to manufacturing or shipping in minutes, not days or weeks. As a result, we're retaining business we would have lost – particularly for service parts."

An order for the Commercial Division, keyed into any terminal in the network, is processed on an IBM System/370 Model 168 at company headquarters in La Crosse, Wisconsin. Under SNA with the Advanced Communication Function (ACF), an order for a home air-conditioning system, entered at the same terminal, is automatically routed to a Model 158 at Trane's Residential Division plant in Clarksville, Tennessee.

A new location can be added to the network in one day, Searle points out, describing SNA as a vehicle for delivering data processing services promptly as Trane acquires other companies or opens new branch offices. At the same time, the network of terminals has absorbed the administrative message traffic that used to travel over a separate system of teletypewriters.

"Some of our most useful applications have become much more widely available in the company, now that any terminal in the system can access any application under SNA," he notes. "At the same time, we are projecting a direct saving of $150,000 a year in hardware and communication charges, by eliminating several single-purpose networks we were operating.

"And SNA has saved us money during implementation. Among other benefits, it relieves the programmers of many of the communications concerns that complicate an online development. Phase one of the project was completed on time and within budget."



A Trane Company technician measures the sound level of a central air-conditioning system. For order entry and other applications, Trane's nationwide data network supports several types of terminal under SNA. As little as one day is required to add a new site to the network.

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

IBM
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"We switched to NCR," says Fred Brown of Rogers Enterprises.

BROWN:
Rogers Enterprises is an optical laboratory that fills almost 5000 eyeglass prescriptions a day. We have a complex computer program that guides us through the entire operation. From selection of the lenses out of inventory through the highly technical grinding process to billing of our customer. We have five years of development tied up in that program. And still we switched from another vendor to an NCR system.

NCR'S DUBOSE:
We could offer you the speed you had to have at a lower price than anyone else.

Fred L. Brown (left) is comptroller/administrator of Rogers Enterprises, Inc., of Beaumont, Texas. Ben DuBose is an NCR district manager.

BROWN:
Yes. And NCR has a full line with no gaps. As our volume increases, we can expand our system in reasonable increments. Even better, we can move to a larger system without obsoleting our software. Now with NCR, I will not have to go through another conversion under the pressure of our daily workload.

NCR'S DUBOSE:
That's NCR's Migration Path Engineering. Your software always runs on the next larger system.

BROWN:
VRX (Virtual Resource Executive) really makes our NCR V-8550 go. Our lab program is very large and is used heavily in the morning, but only occasionally in the afternoon. Because we have virtual memory, this program resides in main memory only when it is advantageous. Otherwise, that program would choke our operation.

NCR'S DUBOSE:
VRX allows you to run up to 35 jobs simultaneously. It dynamically allocates memory and other resources. It controls virtual memory swapping. It constantly monitors for memory thrashing and program loops. And adjusts the job mix to eliminate them automatically.

BROWN:
VRX also provides Online Program Development. Our EDP manager tells me OLPD has doubled our programmer productivity.

NCR'S DUBOSE:
System dependability has been important, too.

BROWN:
That's right. System operation is critical to our business. Before we switched to NCR, we talked to other NCR 8500 users and found they had all had excellent experience with this hardware. And with NCR service. We were particularly pleased that NCR had a service office right here in Beaumont.

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But Most People Get It on the Job

Survey: Business Jobs Require DP Training

Special to CW

STILLWATER, Okla. — Although 92% of business-related jobs involve direct or indirect contact with a computer, more than half the individuals who fill those jobs have no DP-related education, according to a recent study here.

The study, conducted by Prof. G. Daryl Nord of the Oklahoma State University College of Business Administration, was based on a questionnaire distributed by training directors in about 40 medium to large companies within the state of Oklahoma. Out of 280 questionnaires distributed, 123 were returned, Nord said.

Survey respondents defined "indirect" contact with computers as entering data into a system, reading printouts and using a terminal, for example, he indicated.

According to the survey, 36% of the respondents, or 44 people, said they had direct computer contact at their place of employment. Of those 44 individuals, nearly 60% were between the ages of 21 and 40.

In contrast, 55% indicated they had no computer-related coursework in their background when asked, "What is your computer-related educational experience?

Examining these results illustrates that the greater majority of people receive their orientation to computers while on the job, with possibly many receiving no formal training whatsoever. It is interesting to note the 965 thought that a computer course should be offered at the secondary level, Nord said.

The respondents were also asked to look into the future for the possible effects of the computer on the job market in the next 10 years. The rather dreary projections being made by some experts was not totally evident, Nord said.

Fifty percent indicated they think computers will increase the overall availability of jobs. However, 20% felt there may be a net decrease in positions available as a result of increased computer technology.

The results of the survey show that more and more people involved in business occupations are finding it necessary to have some degree of competence in working with computers, Nord said. With this trend projected to continue into the future, the need for quality data processing educational programs becomes increasingly evident, he pointed out.

That such a high proportion of business-related jobs require some degree of contact with a computer is not surprising, according to Nord, when one considers Labor Department figures that indicate roughly half the U.S. labor force is engaged in some aspect of the information industry.

Seminar Slated On Home Utility

PALO ALTO, Calif. — Home and business computing are two of several subjects that will be covered by the Home Information Utility, an intensive seminar scheduled here Dec. 3-4 by the Yankee Group.

Claiming that the local telephone cable will be the backbone of home computer and electronic systems, the speakers will explain such consumer-oriented facilities as The Source, a home time-sharing service; Qube, Warner Cable's two-way communications system; and personal computers.

The fee for the two-day seminar, including research manuals and lunches, is $590. Additional information is available from The Yankee Group, Harvard Sq., P.O. Box 43, Cambridge, Mass. 02138.

DP Exhibition Set Dec. 6 in Los Altos

LOS ALTOS, Calif. — More than 60 manufacturers of computers and peripherals are expected to display their equipment at the Northern California Computer show, to be held here Dec. 6 at the Hyatt Palo Alto Hotel.

Manufacturers that will exhibit include Data General Corp., showing its Micronova product line; National Semiconductor Corp., with its add-on memory systems; Hewlett-Packard Co., showing its desktop computer line, and Control Data Corp.

Four thousand or more persons are expected at the show, which is sponsored by Norm de Nardi Enterprises. The six-hour exhibition opens at 1 p.m.

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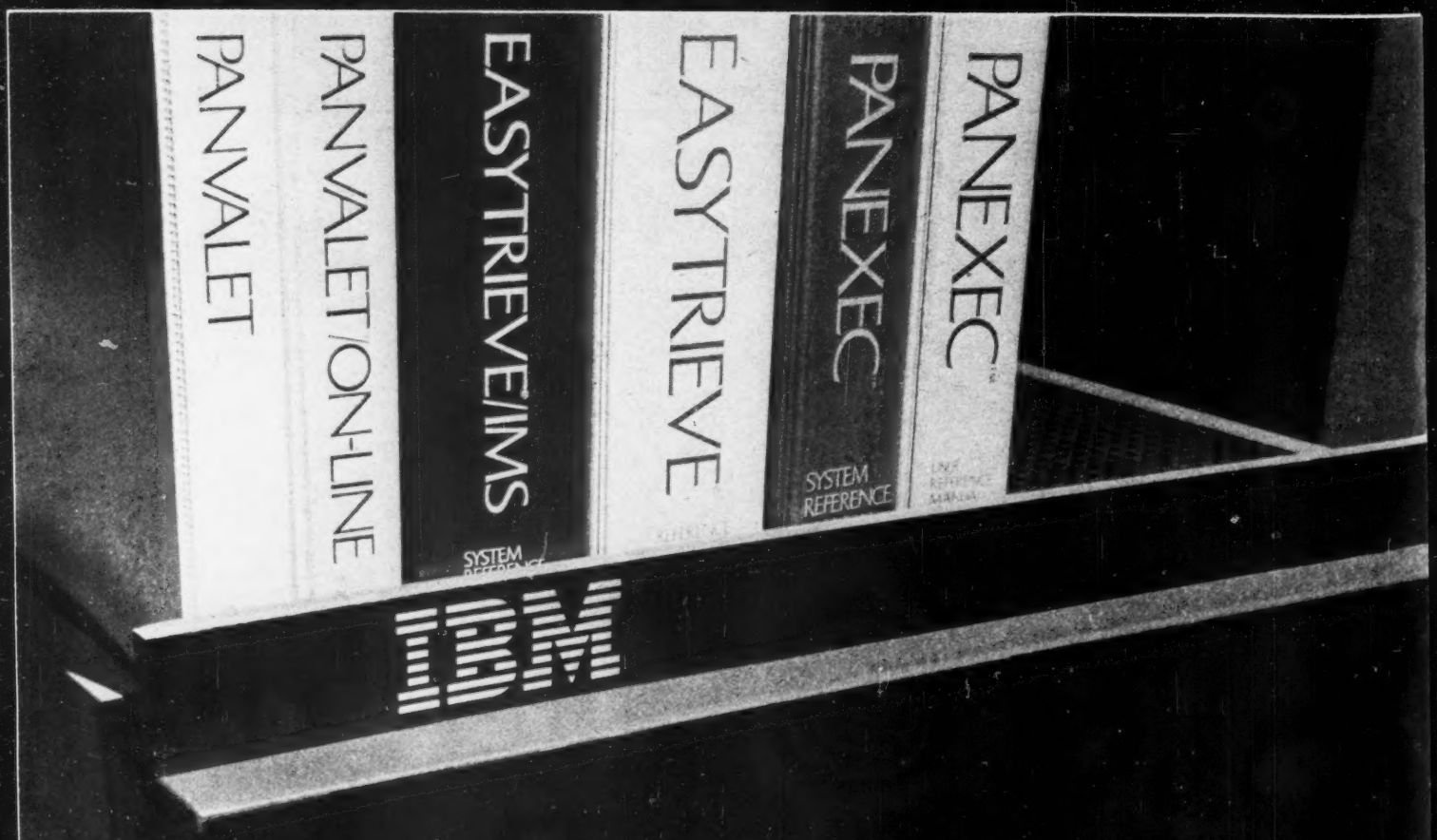

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Compilers to Come in Two Years

Ada Programming Language Gets Fine-Tuning

By Robert L. Glass
Special to CW

BOSTON — Changes to Ada, the Department of Defense (DOD) programming language, have reached the fine-tuning stage, but the first production-quality compiler for the language probably will not be available until early 1982.

That was the outlook of William Carlson of the Defense Advanced Research Projects Agency, who hosted a workshop of Ada Test and Evaluation (T&E) phase participants here Oct. 23-26. Well over 200 representatives of industry, academia and the government attended the T&E workshop — nearly all of them progammers who had used the Ada language to code solutions to representative problems in embedded computer systems.

The four-day meeting was held so that T&E participants could provide input to the language designers — a team from CII Honeywell Bull of France, a subsidiary of the U.S. Honeywell, Inc. — on language capabilities, which were not up to the level needed for professional programmers.

Embedded system applications — typically, real-time software that is part of some larger system like a space vehicle or a rapid transit system — are notorious for having stringent requirements for ultrafast, ultracompact and ultrareliable code.

Frequently in the past, these applications have been coded in assembler language. Among the chief concerns of T&E attendees was that the power of Ada be sufficient to allow its use in place of assembler in such systems.

Carlson announced a schedule for Ada-related events: Formal T&E reports, leading to language refinement, are due Nov. 15. The revised language definition will then be available in March. However, Carlson said, the quality of the language will take precedence over schedule considerations, where reasonable and necessary.

Meanwhile, the first Army-contracted production-quality Ada compiler, to be implemented on the Digital Equipment Corp. VAX-11/780 is expected to begin in January. Earlier optimistic announcements had predicted it beginning in the spring of 1979. That compiler should be completed in early 1982.

In addition, the Air Force will issue a request for proposal for competitive designs for an Ada compiler hosted on several mainframes early in 1980, with contract award and start of work on that project in mid-1980.

Sources Skeptical

Remembering the problems encountered with early PL/1 language compilers, knowledgeable industry sources were skeptical of the armed services' ability to produce high-quality optimizing compilers for Ada on the first try and expect 1982 to be a year of debugging and performance improvement. DOD officials did not dispute these concerns in informal discussions at the workshop.

To support the compilers, a DOD-funded Ada Compiler Validation Capability (ACVC) should be substantially completed by June 1981. The ACVC will be used to verify that Ada compilers correctly implement the language.

T&E participants have been using an Ada "Test Translator," a processor that checks their programs for syntax errors but generates no object code. The Test Translator, which contains an Ada interpreter, was not capable of executing Ada programs until Sept. 1. In addition, its many errors have left most T&E attendees unhappy with the tool.

It is hoped that some university-built compilers — those without optimized code generation — will be available soon to permit actual execution of compiled Ada programs. Carnegie-Mellon University, New York University, Stanford University and the University of Karlsruhe (Germany) are known to be working on such compilers.

Improved Methodology

Jean Ichbiah, leader of the CII Honeywell Bull language design team, called the new language an important contribution to the programming methodilogy field at the workshop's final session.

Programmers using Ada will be reuired to use better methodologies because of the nature of the language, Ichbiah said. He cited Ada as the first language to attempt to integrate such modern concepts as strong typing, multitasking, packaged modularity, separate compilation and generic procedure definition.

Representatives of the Swedish Defence Establishment, the UK and the European System Language Project also spoke briefly at the meeting. All expressed an interest in using Ada.

In parallel with the Ada language effort, an environment for the use of the Ada language is also being defined. The latest iteration in the definition of the requirements for that environment — called the Ada Language Integrated Computer Environment (Alice) — will be discussed at a workshop in San Diego Nov. 27-29. Prof. John Buxton, research associate at Harvard University, is leading the Alice effort.

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DP Disasters Seen Sparking Certification Call

By Brad Schultz
CW Staff

DETROIT — A flurry of disasters attributed to shoddy DP would probably spark a high public demand for certification of DP professionals, a recent conference session was told here.

The stock market crash of Oct. 29, 1929 prompted a campaign to certify public accountants because that crisis was partly blamed on widespread improprieties in reporting corporate financial standings to stockholders, according to Fred Harris, director of the University of Chicago's Computation Center.

Speaking on the 50th anniversary of The Great Crash and toward the end of a year packed with DP-related calamities, Harris suggested that many socially critical DP operations are hard-pressed to ensure quality programming and systems analysis because the DP profession remains essentially unregulated.

In 1979, the Nuclear Regulatory Commission (NRC) ordered many of the nation's nuclear-powered electric plants to shut down because design faults were discovered and attributed to flawed software.

During the week of the conference — the Association for Computing Machinery's annual meeting — the President's Commission on Three Mile Island, headed by time-sharing pioneer John G. Kemeny, called for a "restructuring" of the NRC partly because that agency has allegedly failed to adequately process data on U.S. nuclear plants to determine their public safety.

This year's major airline catastrophes and the debate about DP support for air traffic control have also raised questions about ensuring quality computing [CW, Nov. 12].

DP has become intimately involved with the public's safety and well-being, Harris observed. "Would you want people to practice medicine without certification?" he asked.

Comparing DP to other critical occupations, Harris speculated that public demand for DP certification might force legislators to make such regulation mandatory, regardless of whether DPers want it.

But wouldn't one-time certification "be a means of licensing idiots?" a session attendee inquired. He explained that many certified professionals might fall behind the state of the art after getting certified and employ obsolete methods to design or apply systems.

Moreover, the test by which DPers are certified might be an imcomplete gauge of their competence for certain user functions, he pointed out.

A mechanism for periodically reevaluating the competence of computing professionals is desirable and might also be legislated eventually, Harris replied.

Other members of the audience questioned whether statistics are available to show if an individual's success in the Institute for Certification of Computer Professionals' Certificate in Data Processing program is a valid indicator of success on the job.

Such correlations are difficult to make, Harris said. Nevertheless, several government agencies, including the armed forces, are starting to show preference for certified DP personnel in their hiring practices, he maintained.

Agencies might also start to specify certified work in requests for proposals to implement DP systems, he added.

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Work Force, Equipment Obsolete

Federal DPers Blasted for 'Muddling'

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Federal DPers took it on the chin earlier this month when they gathered here on their own turf for the Federal Computer Conference. They heard themselves repeatedly described as an obsolescent work force trying to "muddle through" with obsolete equipment.

The general consensus of two conference panels Nov. 7 was that problems of aging equipment, few hardware and software standards, an unwieldy acquisition process and the lack of training and clearly defined career paths will continue to plague an already troubled federal DP environment.

With a few notable exceptions, the panel members repeatedly called for more top management involvement in agencies' DP activities as a necessary first step toward solving those problems.

"We need leadership and need it badly, and we need it now," declared Dr. Carl Palmer, assistant director of the General Accounting Office's (GAO) Financial and General Management Studies Division. Addressing several hundred federal DPers, Palmer said, "We're growing obsolete — we, not the machines." "Rapid and across-the-board obsolescence" is eroding government DP management and the work force, he said.

"The government is trailing [industry] significantly as the patterns of obsolesence set in," Peter Jensen agreed. Head of the President's recent reorganization project on federal data processing, Jensen said that more than 100 recent GAO audits have found DP operations in Federal agencies rapidly diminishing in capability, leading to those agencies' reduced effectiveness.

Echoing Palmer's call for more top management involvement in day-to-day DP activities, Jensen referred to a study that found organizations making the most cost-effective use of Data Processing to be those which do have that kind of involvement at all levels.

The problem, he continued, is how to define what exactly upper management involvement is. "How the hell can you get it and how can you live with it when you get it?" he asked.

Demand it

One way to get it is to demand it, according to A.G.W. Biddle, president of the Computer & Communications Industry Association. The user community in the federal government has not been heard from in the federal DP policy debates, he said.

A prime example of the problem, Biddle told his audience, is that "You in the federal government are ambiguous as to whether you want [hardware and software] standards . . . You will not be able to capitalize on the innovations that have taken place in the [DP] industry" without them, he said, urging federal DPers to become active in policymaking.

Unless the federal DP work force fights for the tools it needs to do its job adequately, it will be forced to continually put together "interim updates of obsolete equipment," Biddle maintained.

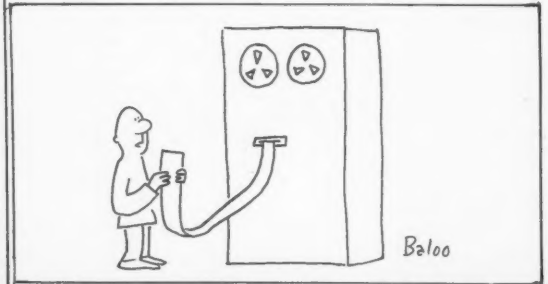
The beleaguered and maligned federal DPer was not without a defender at the conference, however. "I believe the DPer is doing a damn good job for the most part," said Forest Woody Horton, a longtime government DPer and now a consultant.

"I don't think any further top management involvement is the answer" to government DP problems, he added. What is really needed, he said, is a link between DP management and top agency management.

"We're missing an information manager from the organizational landscape — actually a whole array of people" between the technician and the user, he said.

Noting that some people worry about adding more levels of management to already swollen bureaucracies, Horton argued that these are times of increasing complexity and a few more managers would not significantly hurt any organization. Information managers are just as important as financial managers and plant managers, now recognized as necessary parts of modern industry, Horton said.

The president's DP reorganization report alluded to the need for information managers, he added. Several pieces of legislation on information policy issues now before Congress embrace that concept of intermediary managers.



'It Is Rather Nice — But There Just Isn't Much Market for Fortran Poetry.'

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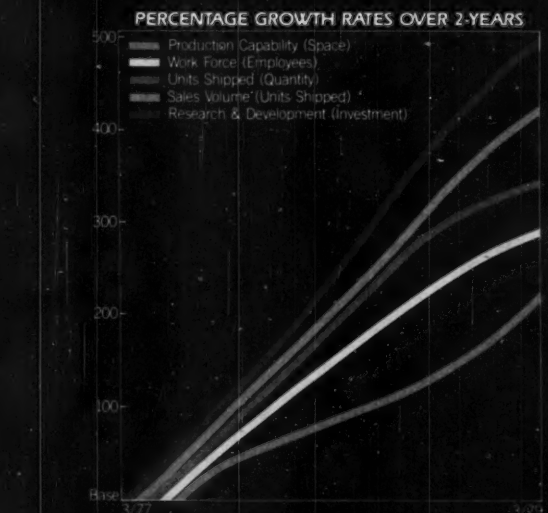

SPERRY UNIVAC

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Levy Undefeated in Computer Chess Tourney

By Brad Schultz
CW Staff

DETROIT — International chess master David Levy won again in the Association for Computing Machinery's (ACM) annual computer chess tournament, which regularly pits Levy against several of the world's most powerful automated chess programs.

But the sportive software gave Levy genuine competition and is nearly advanced to a superhuman level of playing ability, according to several computer scientists at the ACM 1979 conference here recently.

Far from just a diversion, computer chess takes an important place in artificial intelligence research, because methods developed to win chess games can also extend the productivity of computational and inferential software.

Rather than exhaustively considering the full range of possible moves and countermoves, chess programs employ so-called heuristic methods, which take shortcuts to problem solving. Exhaustive search of player and opponent alternatives would swamp state-of-the-art CPUs.

Prof. John McCarthy, a pioneer in artificial intelligence and one-time mentor of Levy at Stanford University, called for increased scientific interest in chess at the ACM conference's concluding luncheon. At tournaments, chess programs should provide researchers with empirical data, lending insight into the cognitive processes involved in chess-playing, he said.

As a computer science graduate student, Levy bet McCarthy that he could defeat any chess program developed during the subsequent 10 years.

The bet became famous and the object of considerable debate in artificial intelligence circles. Would machine finally outsmart man? Since attempts to simulate intelligence have profound ramifications in philosophy, psychology and other disciplines, observers found Levy's challenge more ominous than a friendly boast to an eminent professor.

Last year, McCarthy made Levy a thousand British pounds richer, conceding that the London-based chess master had overcome every nonhuman challenge at one of mankind's oldest games.

Human Contenders

This year, Levy triumphed again — despite a few close calls — in matches against highly rated humans supported by the world's most sophisticated chess processors.

During a five-hour match held in conjunction with the ACM conference here, Levy outmaneuvered David Slate, of Northwestern University, an expert-rated player who relied on a program called "Chess 4.9." Nevertheless, that program took first place in ACM's 10th annual North American Computer Chess Championship — a tournament for computer programs only.

In the contest with Slate, Levy played his chessboard alone in one room and observed his opponent's moves on a closed circuit TV. Slate sat at a table with his closed circuit TV in an adjoining room and suggested various moves to Chess 4.9 coauthor Larry Atkin, also of Northwestern.

Atkin fed the moves into an on-line terminal connected via phone lines to a high-performance Control Data Corp. Cyber 176 located in Minneapolis. The $10 million CPU printed back its appraisal of the suggested moves and proposed alternatives for Slate's consideration. Slate made his decisions under a time limit of three minutes per move.

While former International World Chess Champion Max Euwe and international chess master George Koltanowski explained the moves to a rapt audience in a third room, Levy battled the state-of-the-art CPU.

In the North American championship, second place went to "Belle," a program written in C and assembly language that ran on a Digital Equipment Corp. PDP 11/70 supermini at Bell Laboratories in Murray Hill, N.J.

Will Levy meet his match? The intrepid Englishman now offers $1,000 to anyone whose chess program can beat him before 1984.

"TWO WORDS TURNED OUR MANAGEMENT'S ATTENTION TO IN-HOUSE COMPUTER OUTPUT MICROFILM."

DP Officer, Mr. William Mengel of Guarantee Bank in Atlantic City, N.J., met with DatagraphiX recently and spoke about his role in convincing upper management to acquire an in-house COM system.

DATAGRAPHIX: "Those two words management listened to must have been fairly strong."

MENGEL: "When you talk to management about new equipment that gets the job done efficiently, easily and quickly, two words immediately come to mind—*time* and *money*. A DatagraphiX Computer Output Microfilm system saves plenty of both."

DATAGRAHPIX: "How do time and money relate to an in-house DatagraphiX system?"

MENGEL: "When you use an outside service, your performance depends on their ability to ferry your microfiche and tapes back and forth, day after day. When your COM system is in-house, you've got a lot more control. You don't miss deadlines or waste money because of lost time."

DATAGRAPHIX: "Was the cost of the equipment a major factor?"

MENGEL: "Sure, but we hit the break-even point almost immediately. And with growth projected over the next five years, in-house Computer Output Microfilm will not only pay for itself, but save us a lot of money. After mapping out the past, present and future, it's definitely cost-effective."

DATAGRAPHIX: "What were the other advantages?"

MENGEL: "First, the system was very simple to incorporate into our DP operation. DatagraphiX offers a wide variety of hardware and software to suit our particular needs. We had a choice between off-line recorders, minicomputer controllers and on-line recorders which let us match our recorder to our specific COM requirements."

DATAGRAPHIX: "Was your decision to go with a DatagraphiX system also based on reliability?"

MENGEL: "We only heard good things about DatagraphiX equipment. It has a fine reputation for reliability. One-vendor service for preventative and on-call maintenance programs was also a major factor."

DATAGRAPHIX: "So you're pleased with your move to in-house COM with DatagraphiX?"

MENGEL: "For us, bringing COM in-house was the only way to keep our data processing costs in check."

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By Separating, Identifying Proteins

Data Reduction System Aids Cancer Scientists

By Marguerite Zientara
CW Staff

ARGONNE, Ill. — Early cancer detection, proper tumor classification and therapy evaluation may be facilitated by recent computer-aided developments in molecular anatomy achieved at the Department of Energy's Argonne National Laboratory here.

Such capabilities depend on scientists' ability to locate protein molecules within a cell, examine the physicochemical properties of the 30,000 to 50,000 human proteins and understand the biology of the entire cell, according to Leigh Anderson, a researcher at Argonne's Biological and Medical Research Division, where such work is now being done.

"We estimate that the properties of only 300 to 500 human proteins — exclusive of immunoglobulins — have been described, and a very much smaller number characterized in detail," Anderson said. "This leaves approximately 99% of the working parts of human cells unknown and with functions largely unsuspected."

Such an understanding would allow the analysis and listing of types of proteins in each of the 100 different human cell types to help differentiate normal cells from cancer cells, Anderson explained.

"It is doubtful whether human cancer will ever be understood in the absence of such lists," according to Dr. Norman Anderson, Leigh's father. Norman Anderson brought the project to Argonne in 1976 from Oak Ridge National Laboratory, where he founded the Molecular Anatomy Program 25 years ago.

Two-Dimensional Technique

Researchers in Argonne's Molecular Anatomy Program have developed a two-dimensional technique that now makes it possible to begin the enormous task of separating and identifying all of the protein gene products in the human body.

Called the Argonne Iso-Dalt System, the technique first separates proteins — which are fairly large chemical molecules — into thin gels, Leigh Anderson explained. "If you then put an electric field across such a gel, you can make the proteins migrate or move through the gel."

After making a separation related to the chemical composition of the proteins, "perpendicular to that separation we do a second separation that is related to the size of the molecule," Leigh Anderson said. "So we're separating on two distinct parameters, one after the other, to get a two-dimensional separation — we get spots on a square plate, for example."

Spots on Maps

What the Iso-Dalt gels reveal are "maps" of protein gene products in human blood, urine and tissue samples, with each protein showing up as a spot on the map.

"Our objective is to describe each spot by name and/or function and to assign to each spot a sufficient number of properties to allow each to be distinguished from all other protein gene products," Norman Anderson explained.

To that end, the computer software program quantitates all the "spots" — or individual kinds of proteins — of the two dimensional patterns, Leigh Anderson said.

The computer then analyzes and intercompares hundreds of Iso-Dalt analyses using a data reduction method, searching for correlations among the abundances of the different proteins.

The computer analysis portion of the technique is still under development after 18 months' work, Leigh Anderson explained.

The researchers use a Digital Equipment Corp. PDP-11/60 with 256K bytes of memory. An Optronics International, Inc. P1000 scanning system digitalizes the image initially.

A Grinnell Systems Corp. GMR-27 color TV display lets the scientists look at the images of the gels and Floating Point Systems, Inc. AP-120B array processor does the mathematical computations necessary to the technique, Leigh Anderson said.

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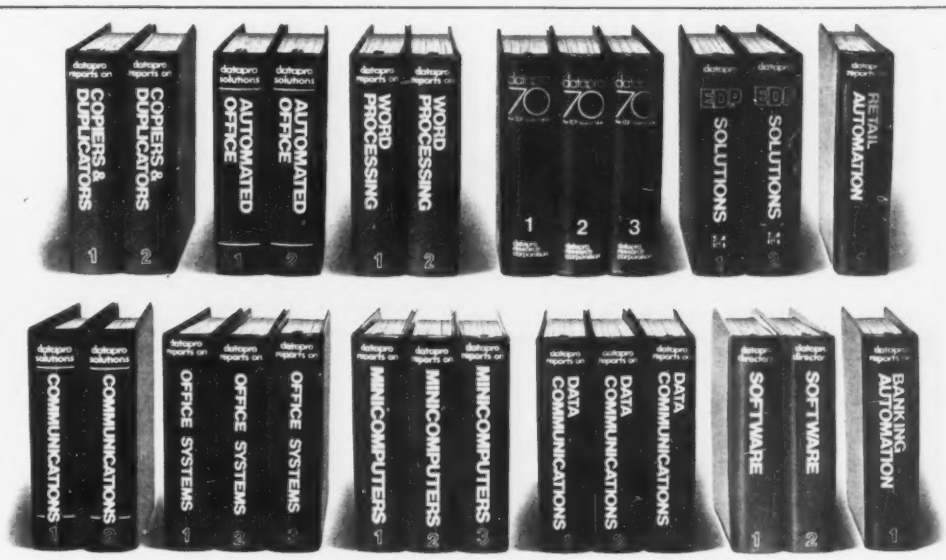

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While Easing Pharmacy Work Load

System Warns Pharmacist of Drug Conflicts

By a CW Staff Writer

LOCUST, N.C. — A druggist here has been working to promote the use of computers to prevent the unintentional prescription of drugs that might interact dangerously with other drugs that a patient is already taking.

Jesse Pike Sr., owner of a small chain of drug stores called Pike's Rexall Drugs, converted his stores in 1974 to an on-line system that recognizes potentially harmful combinations of prescriptions.

The system was a logical outgrowth of the store's own patient profile program, a manual system that kept a record of all prescriptions so the pharmacist could check a patient's file before handing over a new prescription. The computer-aided system was suggested by Pike's son Jesse Jr., who had graduated with a bachelor's degree in electronics before becoming a pharmacist.

Two-Part Software

The software for the system came in two parts. Pike obtained sophisticated software on drug interactions that was written under the leadership of Dr. Mark Bronstein. Bronstein heads a team of pharmacists and doctors at the Medical University of Charleston, S.C., who continuously update the catalog of known drug interactions.

The patient files, label preparation, inventory control, third-party billing, drug referencing and other administrative tasks, are handled by the Datastat system, marketed by the Atlanta-based National Data Corp.

As for hardware, each store is equipped with a Hazeltine Corp. 1500 or 1200 CRT terminal connected over leased lines to one of National Data's array of Data General Corp. Eclipse series minicomputers. A General Electric Co. split-platen printer simultaneously prints a prescription label and a record of the prescription for as many as 400 prescriptions a day, Pike said.

If the system spots a potentially harmful combination of drugs, it will warn the terminal operator of the seriousness of the interaction. For the most severe levels, it will refuse to print the label for the prescription unless overridden by the pharmacist.

Pike said many doctors have been skeptical of a pharmacist who calls and informs them that they have prescribed drugs that will be harmful if taken with another prescription. But they have come to rely on the expertise of the people behind the system, he said.

Though the program is set up primarily to prevent dangerous combinations of drugs, it has also saved Pike a lot of money and time.

Within a month of installing the system in 1974, the company found the computer-aided system cost less to operate than the preceding manual system. "We eliminated three-and-a-half jobs right off the bat," Pike recalled.

The same work load that took three pharmacists to handle during periods of peak activity can now be managed by a trained terminal operator and a pharmacist. Billing, which has become increasingly complex as pharmacists slog through state and federal regulations and procedures, is greatly simplified by the computer, he said.

Inventory has been cut by 25%, and it can be turned over 11 times a year instead of five times.

Pharmacist checks prescription against patient's file to prevent dangerous drug combinations.

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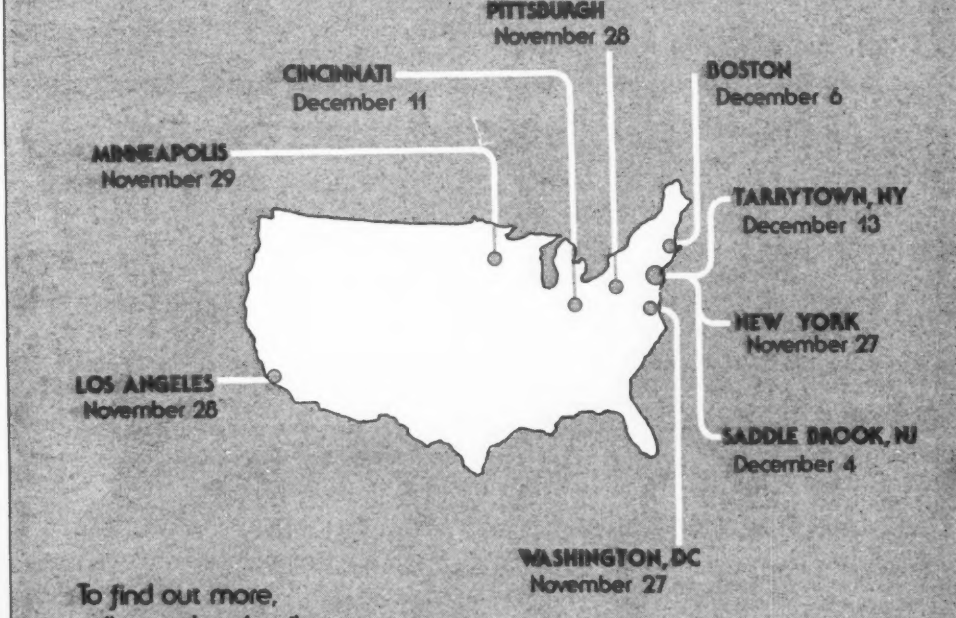

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SECOND ANNUAL LOUSIANA COMPUTER EXPOSITION, Lafayette, La., Feb. 22-23.

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Authors should submit three copies of an extended abstract consisting of eight to 10 typewritten, double-spaced pages as soon as possible to Boumediene Belkhouche, Formal Paper Session Coordinator, or Gregory A. Riccardi, Faculty Exposition Coordinator, Computer Science Department, University of SouthwesternLousiana, P.O. Box 44330, Lafayette, La. 70504.

ABA Young Lawyers Unit to Host Computers in Litigation Program

SAN FRANCISCO — A two-day conference focusing on computers in litigation will be held here Dec. 6-7, sponsored by the Antitrust Committee of the American Bar Association's (ABA) Young Lawyers Division.

Featuring such speakers as Robert P. Bigelow of Boston and the Department of Justice's E. Hugh Kinney, the program will center on the computer as a litigation tool, pretrial discovery and the computer, and the computer at trial.

Topics covered will include what the litigator should know about how the computer works, when computer-aided support is necessary and how to purge the right information from document storage and retrieval systems, a spokesman noted.

The lawyer's role in the selection of a computer system and computerized jury selection will also be discussed, he said.

Registration fees are $250 for ABA members, $275 for nonmenbers and $175 for law students. Further information can be obtained from ABA National Institutes, 1155 E. 60 St., Chicago, Ill. 60637.

DPMA '80 Slated For Philadelphia

PHILADELPHIA — The Data Processing Management Association's (DPMA) international conference and business exposition will be held Oct. 26-29 at the Sheraton Hotel here, DPMA officials have announced.

DPMA '80 will combine an educational program with a business exposition, displaying the latest in computer equipment, supplies and services.

The 1979 conference, recently held in San Diego, reportedly attracted more than 4,100 people from the U.S. and 15 foreign countries.

More information on DPMA '80 can be obtained from Bill Zalud, DPMA, 505 Busse Highway, Park Ridge, Ill. 60068.

Calendar

Dec. 3-4, Washington, D.C. — **Transnational Data Flow Conference.** Contact: Information Gatekeepers, Inc., Suite 212, 167 Corey Road, Brookline, Mass. 02146

Dec. 6-7, Miami — **Computer Failure and Energy Shortages.** Contact: Computer Management Corp., P.O. Box 1403, Rockville, Md. 20850.

Dec. 10-14, San Diego — **Tutorial Week '79.** Contact: Institute of Electrical and Electronics Engineers Computer Society, Suite 301, 5855 Naples Plaza, Long Beach, Calif. 90803.

Dec. 12-14, Los Angeles — **Data Communications: Effective Network Design.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 12-14, San Francisco — **Integration of Word Processing and DP Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 12-14, San Francisco — **Third-Party Leasing Negotiations Seminar.** Contact: International Computer Negotiations, Inc., 1331 Palmetto Ave., Winter Park, Fla. 32789.

Dec. 13-14, Boston — **Word Processing for Secretaries and Administrative Support Personnel.** Contact: Management Resources International, Inc. 6621 Electronic Drive, Springfield, Va. 22151.

Dec. 17, Boston — **The Detection of Fraud.** Contact: The Foundation for Continuing Education, 15 School St., Boston, Mass. 02108.

Dec. 17-19, San Francisco — **Microprocessors in Systems Design.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Dec. 17-19, New York — **Structured Analysis and Design.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

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The Challenger III systems offer features which make their performance comparable with today's most powerful mini-based systems. Some of these features are:

Three processors today, more tomorrow.

The Challenger III Series is the only computer system with the three most popular processors— the 6502A, 68B00 and Z-80. This allows you to take maximum advantage of the Ohio Scientific software library and programs offered by independent suppliers and publishers. And all Challenger III's have provisions for the next generation of 16 bit micros via their 16 bit data BUS, 20 address bits, and unused processor select codes. This means you'll be able to plug a CPU expander card with two or more 16 bit micros right in to your existing Challenger III computer.

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Five DOS options including development, end user, and virtual data file single user systems, real time, time share, and networkable multi-user systems.

The three most popular computer languages including three types of BASIC plus FORTRAN and COBOL with more languages available from independent suppliers. And, of course, complete assembler, editor, debugger and run time packages for each of the system's microprocessors.

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some very smart OEM's

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Mail to: Ed Hayes, Dept. 363
19400 Homestead Road, Cupertino, CA 95014

EDITORIAL

A Crucial Commitment

DP users should promote the concept of in-house personnel training to ensure an adequate supply of trained professionals in the decade ahead.

A recent draft report by the Association for Computing Machinery's (ACM) Curriculum Committee on Information Systems indicated that U.S. users cannot rely solely on universities and colleges to furnish the sort of training demanded in applied computing [CW, Nov. 5].

However, that report, which found an inadequate number of applied DP programs in compliance with ACM curriculum guidelines, is no grounds for assuming that few academics care about training DPers. In fact, the ACM committee that did the report exists because many academics are deeply committed to provide high-quality education in this area.

The situation seems an inevitable consequence of developments in computer science as a discipline. As the ACM committee attests by its very existence, computer science is quite different from DP in its objectives and methods.

But computer science programs have generated a major portion of the people who entered the DP profession in the 1970s. Why? Because, at many schools, computer science departments were almost the only route available to undergraduates who sought programming skills in order to get DP jobs.

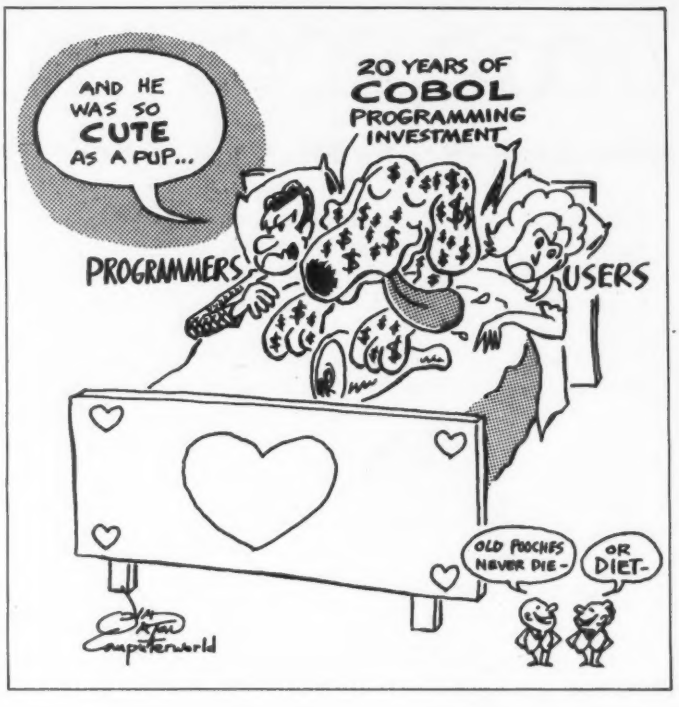
Computer science departments are research-oriented and generally emphasize theoretical topics in computing — some of which scarcely relate to the working DPer's problems. Many of these departments offer no instruction in Cobol, the most popular DP language. Most encourage programming in Lisp or similar string-processing languages that most DP shops consider avant garde — if they've heard of them at all.

In recent years, a number of schools have launched programs in data processing as distinct from computer science. The applied programs go by many different names — the ACM committee found 124 U.S. programs under 37 different names — but share a well-defined purpose: preparing people to work with higher management in designing and implementing systems for information control.

The user community should do what it can to support such pioneer efforts in the academic sector. Nevertheless, there will probably not be enough strictly DP programs in the schools to meet the personnel demands users will face in the next several years.

That is why users must commit themselves to in-house training of entry-level personnel. They must reconcile the discrepancies between the skills taught in academic environments and the skills demanded in applied environments. Lateral movement from programmer to data base manager to other DP job slots should be encouraged as a mechanism for learning-by-doing.

Such commitments are crucial during the infancy of academic programs in DP.



DATA PAST

Five Years Ago
Nov. 20, 1974

WASHINGTON, D.C. — A General Accounting Office report blasted poor documentation in federal government computer programs for losses of millions of taxpayer dollars and years of programming effort.

— — —

MONTREAL — ICL Ltd. introduced its 2903 computer system to North America at the Canadian Computer Show and Conference here. Pegged to compete with the IBM System/3 line, the 2903 employed integrated circuitry and microprogramming.

Eight Years Ago
Nov. 17, 1971

CLEVELAND — Technological advances in data transmission made it "increasingly feasible to consider remote data processing operations" when computer installations were faced with expansion or rebuilding, a DP consultant stated in an interview here. Roy S. West, staff consultant for DP facilities with Austin Co. here, said remote operations presented a "valid alternative" to "congestion, insufficient parking space, inadequate mass transportation, deteriorating property values and threats to property."

LETTERS

Tools, Not Swords

That's it! I've had it. Please tell me when Pacifico Lim, Bruce Sherman and countless others will open their eyes and minds. I'm referring to "Users Should Avoid All Cobol GOTOs" [CW, Nov. 5].

When will professional programmers stop picking up a tool and then trying to find a job for it. When will we learn that a tool (any tool, be it a PERFORM, GOTO, hammer, scalpel) is meant for a specific job, that each is useful in its own way and that the hands using the tool must be comfortable with it before it can be productive.

From my point of view, Lim and Sherman have both mastered their respective tools, and should now learn to use them to productive work rather than brandish them as swords for battle.

Paul J. Maszczak
Murray Hill, N.J.

Code Won't Work

In reference to Bruce Sherman's commentary on Cobol GOTOs [CW, Nov. 5], Sherman's code in Figure 3 will not work. On any Cobol compiler I am aware of, after the "CLOSE TRANSFILE" statement, the computer will drop into the "REFORMAT-PROCESS" paragraph, read "TRANSFILE" again, which is already at end-of-file, and Abend. I didn't bother to look at the other examples.

James L. Gillaspy
Houston, Texas

Marketing Ingenuity

IBM's recent reduction in memory prices is another landmark for its marketing ingenuity. IBM's deliveries on memory now are on a scheduled basis of one year.

IBM's announcement reminds me of the butcher who advertises sirloin steaks at $1.09 a pound when the going price is $2.85.

When you can't deliver, the price is always lowest. It is also true in the used computer marketplace.

In the case of the IBM 30 series discounts, the four-year backlog of deliveries turned to 18 months with 30- to 60-day deliveries. As in the dress business, the first discount is the smallest discount. Incentive to purchase is oriented to IBM profits.

George S. McLaughlin
Summit, N.J.

Accurate Reporting

I was impressed that in "The Way to the Top..." [CW, Oct. 15], Marcy Rosenberg was able to convey accurately the essence of my convictions concerning what I believe to be the dichotomy between business systems analysis and computer programming and, more to the point, those attributes which I believe essential for those with their sights set on the executive suite. The conditions under which her interview with me was conducted were complex and difficult.

Concerning the reason for the recent resignation of our programming manager, if I actually said during the interview, "Primarily because I didn't perceive her as growing into a business systems analyst," I hastily take it back. Indeed, I mean to suggest that as a *possible* reason for her leaving. Any of the other conventional reasons for changing jobs — such as more money, better career opportunity, technical challenge, hatred of the boss — may have been factors, or even dominated.

Roger C. Guarino
New York, N.Y.

Computerworld welcomes comments from its readers. Letters should be addressed to Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

HUMAN CONNECTION/Jack Stone

How to Win Novice Office Systems Users

It will be *some* kind of challenge to gain first-time users' acceptance of the "office of the future." I believe the DP department will wind up with office systems development responsibilities and needs all the help it can get in dealing with this special set of users.

Administrative people have operated for years in an office environment where not a whole heck of a lot of management — other than cost control — has been going on. Part of the problem is that administrative service functions do not easily adapt to objective performance measures (a comment that is often discussed in DP circles). In addition, executives pay too little attention to administrative areas — they'd much rather be analyzing marketing performance or product plans.

But now executives are looking at their administrative functions very carefully for two reasons: first, because these labor-intensive operations cost an arm and a leg and are growing more expensive and, second, the new computer-based office systems offer hope of countering the sagging productivity index of office personnel.

Convincing Users

However, if office system benefits are to be realized in their fullest, office workers will have to be convinced that the systems will not merely operate reliably, but will do very specific things for each of them to help in their jobs and future careers. And the key to convincing them is early — and effective — communications.

Stand-alone word processors, of course, have helped pave the way for "integrated" office systems which tie the broadest range of information processing technologies into multifunction workstations. But the difference between the word processor and workstation is great. I believe most clerical personnel will have a devil of a time handling chores much beyond the automation of existing office procedures without a well-constructed training program — something that's far beyond a cassette tape describing keyboard commands, such as one vendor offers.

This is the last article in a four-part series called "Office Automation: DP Challenge or Burden?"

A key component of a comprehensive early communications program, effective training of workstation operators/users — in addition to workstation operations and information processing concepts — involves the positioning of individuals and their information processing functions with respect to the total information processing network of the firm.

This helps a person realize several things: that what he is doing is an essential piece of the total information system and, therefore, that he is making an important contribution to the firm; that the individual has an important responsibility to process work within deadlines or else the system will suffer; and that the development of skills and knowledge in computer-based office systems will enhance career growth.

Helpful Tactics

Other aspects of the early communications program should be keyed to the same theme. Here are some candidates for communications projects that may be helpful:

- Arrange a live address by several top executives stating their commitment and support to the office automation program. If it can't be live, then use a videotaped broadcast. If the executives are not good public speakers, reach down into the organization until you find one who is.
- Run some office workers through the workstation operations "hands-on" at the development site or back at the vendor's ranch. The project will build some appreciation for your thoughtfulness, may result in some decent feedback and certainly will develop some good press for you in the offices you will be serving. But don't do it unless the system operates reliably.
- Send your information bulletins/newsletters on a regular basis as progress reports. Be sure to allow for questions and answers. This vehicle can be very effective in allaying fears of the automation bogeyman.
- And, for heaven's sake, go slowly in the level of applications you let loose on the workstation user. Go first with those which are close to what the user already knows on a manual basis, and never introduce a new one unless the others are almost down pat.

THE TAYLOR REPORT/Alan Taylor

'Good' File Designs Bring Trouble

The very first concern of any computer application is file design. Decisions made at this early stage about particular fields are subsequently built into all other parts of the system. This often makes it impractical for many of the results of file design decision to be changed.

True, with high-level languages such as Cobol, it is possible to change field lengths. Provision of a two-character field for age, for example, can be changed to three when it is realized that there are living people older than 100. But to change the basic function of a field — to give birth data instead of age — is almost impossible. This change involves not only performance, but also changing, or at least reviewing, the logic of all the programs touching the file.

For instance, consider the programs needed when a child-support order payment schedule is being reviewed for conformance and the child's age is given directly, as opposed to indirectly (by recording the date). The second program is different from, and longer than, the first.

The second program would look approximately like this:

IF BIRTHDATE-YEAR + 21 IS GREATER THAN CURRENT-DATE YEAR THEN LIABILITY-YEAR = BIRTHDATE-YEAR + 21 ELSE LIABILITY-DATE = CURRENT-DATE.

The earlier program would simply be:

IF AGE IS GREATER THAN 21 GO TO NO-CHILD-SUPPORT.

More likely, however, it would omit the test.

The type of error caused by faulty file-design using only temporarily correct fields is unlikely to be caught by any programmer-created tests.

The programmer checks the programs and assumes the files. It is simply too late at this juncture to check or change file design.

Programmer tests aside, if the problem were found after the program was delivered, the normal solution would not be to make the information accurate on a permanent basis. Instead, the operational systems would be changed to neutralize the problems during the special runs of one sort or another. The potentially inaccurate information would remain on the files, waiting for a suitable set of circumstances to cause havoc.

The ability of the temporary-only fields to survive repeated exposure of the problem has had particularly bad results. As an example, a recent Taylor Report discussed a credit-card company that claimed it could not correct a false charge that kept reappearing on a client's statement.

Computers get blamed for this reported inability, and if a sophisticated person objects, the blame is transferred to some programmer who may have had no part in the design of the files. The idea that an error will be allowed to remain — threatening arrest or perhaps the cutoff of your credit — is particularly frustrating.

Yet, if it were merely a programming problem where a test had been left out, it could easily be put right. The prevalence of continued-error systems strongly indicates that more than a program-bug is involved. Transient file-design problems like the ones instanced above are much more likely to

(Continued on Page 35)

READER COMMENTARY/Paul Sita

DP No Longer Just A Support Function

At each stage in the evolution of data processing, there have been substantive "people" concerns. These concerns have been at once both representative of and an integral part of the vital issues facing the industry as a whole.

Focusing on these "people" problems acts as a valuable lens through which the wider problems may be viewed and understood.

In the 1950s, concern centered on the rate at which computers might replace people. The predominating theme was that computers could do what people could do with paper and pencil — only much faster.

That claim was marginally true at best. While some people were displaced, many new jobs and types of jobs were created. Roles were changing, and DP was the place for "mavericks" in the organization.

The late '50s and early '60s saw the development of DPese, that meandering style of mnemonics which threatened to erect an impenetrable barrier between DP and the rest of the business. It was seriously questioned whether DP was capable of being assimilated into the corporate structure.

Part of the problem was the defensive attitude possessed by those mavericks who had made the transition to DP. This attitude was totally unwarranted since, at that time, DP was solely a function for specialists. There was no need for technical jargon to protect the private enclave of DPers, yet they perceived such a need.

The great promise DP seemed to hold for business was seriously hampered by this communications barrier. It left management with an inability to deploy its information resources in an effective manner and to integrate the organization as a whole as well.

The next phase, the middle '60s to early '70s, saw great advances in hardware capability, a decline in the cost of computing and the introduction of minicomputers. The advent of data base and distributed data processing brought computers into a wide variety of vital business functions.

This elevated DP in the corporate echelons. It was less a realization of the value of information per se than the fact that corporations simply needed DP to make their accounting and financial systems work.

The people emphasis during this period was still with the user; the demand for talented systems and programming support far exceeded the supply.

(Continued on Page 36)

LETTERS

Winett Ms-Taken?

In her otherwise excellent sixth article on better writing [CW, Nov. 5], Ruth Schiff Winett made the following statement: "Note that since 'Ms.' is an abbreviation, it takes a period." Abbreviation for what? According to the ERA persons, Ms is Ms.

Overlooked but equally vexing is the problem of how to address a reply to a correspondent who signs a letter as indicated below.

W.P. McDonald

Hartsdale, N.Y.

The King's English

I suppose *Computerworld* has been inundated with letters pointing out the violence done to the English language in the Nov. 5 issue. Since CW featured a story on the "Journal for Iliterate Programmers," I suppose it's quite appropriate that contributors (or editors) made more than their share of howlers.

The most striking example was in the headline straddling pages 34 and 35: "Users Should Avoid All Cobol GO-TOs . . . In Most Cases They Make Worst Code." Unless you meant "*the* Worst," as in "He's duh *worst*," "Worse Code" would have sufficed.

I got quite a charge, too, from the misprint in Miriam G. Vedder's letter. She wrote ". . . This kind of solecism: the ubiquous 'hopefully.'" Even a scouring of the OED doesn't turn up a "ubiquous," just the same crummy "ubiquitous" we've endured for more than 200 years.

Finally, I come to a real, if overgnawed, bone of contention: Ruth Schiff Winett's word (the last, I hope) on the supremely important issue of nonsexist suffixes in English. I'd like to point out two facts:

1. The suffix "man" as in "chairman" is a purely genderless, unstressed holdover — yes, it is true — from the beastly past. But to refuse to write "vice-chairperson" *is* a reasonable action by anyone who cares about the integrity of the language and who will not be bullied (sorry: cowed) into stooping to silly fads.

2. "Human" is not, by any stretch of the reasonable mind, a "sexist" word. Ms. Winett may not know any Latin, for the word's origin is in *homo*, which meant "human being," not "man." The Romans, persons for all seasons, resorted to the word *vir* to denote the oppressors of *feminae*.

Get wise, girls.

Terence Hughes

Lawrenceville, N.J.

Drug Abuse Taken Lightly

I was not pleased to read the articles in *Computerworld* about Phil Lesh of The Grateful Dead [CW, Nov. 5].

The objection I take to this article concerns the frivolous wording in relation to the use of psychedelic drugs, as in the following excerpt:

"[Electric music] — especially in conjunction with the use of psychedelic drugs — can be a powerful means of inciting the listener to view his world differently and become less inhibited."

Certainly sentences like this show poor judgment in what I've always considered a conservative news journal. Drug abuse is not a light subject, and I feel that such references contributed very little to the subject in the articles.

Greg Collier

Grants Pass, Ore.

Color Graphics Terminals

The recent article on color graphics terminals [CW, Oct. 29] was very timely, with this market area growing faster than almost any other area of DP. There was, however, an error in the table entry for Vector General which we would like to correct. The Vector General 3300 series *is* available with a choice of beam-penetration color displays.

Interactive Graphic Systems, Inc. is the largest supplier of graphics software for Vector General displays and our products, GAM (a PDP-11 I/O handler) and GDL (a set of Fortran-callable subroutines), fully support the color features.

As an example, British Rail is using a Vector General 3302 with a 22-in. diameter color display and GAM/GDL to schedule trains. The use of color provides a dramatic increase in comprehension of a complex set of timing diagrams. Neither raster-scan color nor random-scan black and white could have conveyed the necessary information.

Kenneth L. Wheaton
President
Interactive Graphic Systems, Inc.
Woodland Hills, Calif.

'Inventory of Misconceptions'

The inventory of misconceptions in "Should You Merge DBMS and Data Dictionary?" [CW, Oct. 29] must be challenged by common sense.

Common sense dictates that physical I/O be controlled and this is made possible by the use of tables loaded from external files called "directories." It is dumb to process the directory on an as-needed basis. When logic moves to a directory, the user assumes control. The user fine tunes the system without program code changes.

Second, there was a misconception regarding an active and passive dictionary. A dictionary on a 3-by-5 card file is passive and so are most dictionaries that do nothing but print manually entered facts. The printed reports are obsolete before being distributed.

If the dictionary is driven, it does nothing to improve the quality of the data. If it tells you garbage exists, you can still ignore it.

The active dictionary must drive or it will die. When it drives anything and fails, it will be corrected and validity ensured. When it supplies a data description language and it is invalid, it must be corrected.

The custom-built programs of the past are reinvented wheels with many hotboxes and as such are on the way out. There is a new form of independence called logic independence which applies to the use of a directory. External selection of hard-coded logic produces logic independence and returns control to people.

A. Vasch

Grand Rapids, Mich.

Hot Prospects for Whom?

The feature "Hot Prospects Seen for DPers" [CW, Sept. 24] was misleading and irresponsible on the part of *Computerworld*. I believe most DP managers take such placement agencies' exaggerations with a grain of salt.

However, I also believe that such features incite "job-hopping" by staff professionals to the benefit of Fox-Morris and their peers. The article was a tremendous agency sales tool the way it was written, e.g., the use of the word "demand" nineteen times.

Because of the dramatic growth in our businesses, we at The Harvest Companies are actively recruiting DP professionals and have spent a significant amount of time in establishing very competitive salary ranges for various positions. The salaries presented in the feature created a very fuzzy picture of what the real salary world is like.

We have tied in our salary levels to a plan of career progression, which includes experience requirements and specialized training needs at each level. We constantly compare our levels to reliable and responsible surveys such as *Hansen's Weber Salary Survey* in order to keep our personnel competitively compensated. There is a minimum of correlation between our data and the data presented.

I suggest future published "surveys" be substantially more explanatory on the basis on which they were prepared as well as the meaning of the statistics contained therein. A survey prepared from a placement agency's file of client job orders is not a meaningful indicator of actual compensation levels.

I imagine that agencies constitute a large portion of your advertising revenues and you have a need to serve them — but do not forget about your subscribers in the process.

Donald T. Baker
Director, Information Resources
The Harvest Companies
Cleveland, Ohio

PDP-11 User Reactions

Our company wishes to obtain reactions from the PDP-11 user community concerning the marketability of a new Cobol compiler whose capabilities and capacities far exceed those of the Digital Equipment Corp. Cobol product.

The compiler we are considering is operational and has undergone federal Cobol compiler validation, but its availability to date has been restricted to military projects.

Those interested should respond on company letterhead to Seidel Computer Associates, Inc., 458 Orion Way, Newport Beach, Calif. 92663.

Ken Seidel

Newport Beach, Calif.

Editor's Note

W.D. Voight, business manager of Ohio State University in Columbus, recently sent Computerworld *a letter asking if any readers knew of manufacturers of file protect/write rings that effectively convert tape reels into read-only storage, [Oct. 8]. Voight had several responses and learned that the product he sought was available from a firm in Illinois called Visible Computer Corp. Voight said he ordered 2,000 of the devices and reported that "things have worked out real well for us. I'm very happy about the situation."*

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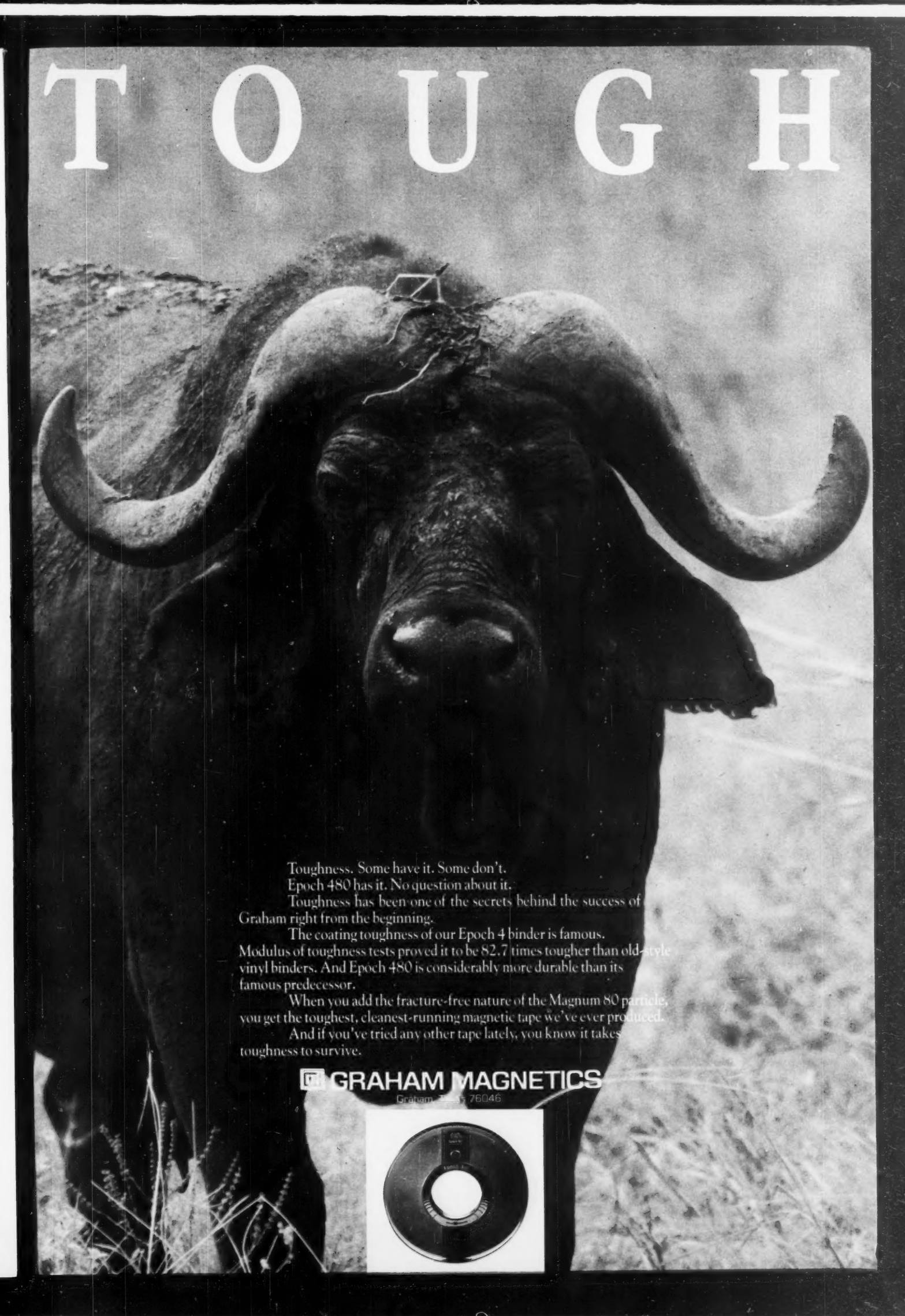

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SOCIOLOGY OF COMPUTING/Robert L. Glass

Tale of a Program That Fell Through a Crack

A program worth more than $100,000 fell through the bureaucratic crack at the Ecology Energy Co. a few months ago. Here is how it came about:

It didn't take Ernie Barr long to figure out that fluidity was the key to personnel manipulations at Ecology. What I mean is, Ecology believed in being able to marshal its technical troops en masse in whatever new energy territory was being contractually explored by the government.

If solar heat was big, Ernie and 23 other Ecology technicians suddenly wore solar hats and worked solar projects. If wind power was big, Ernie joined a team which knew how to exploit windmill technology. If earth heat was in, Ernie went to Yellowstone and poked at geysers. If coal was king, Ernie went underground in West Virginia and emerged blackfaced.

But what has all this to do with a computer program falling through the corporate crack, you may ask? The answer, as you will soon see, is "everything."

About a year ago, Ecology landed a lucrative research grant for a simulation study of the ocean's currents to determine the viability of their use as an energy source. Ernie was assigned to be the programmer part of the newly appointed team of Ecology ocean experts.

The team settled down in San Diego (it was winter) for some serious oceanographic mathematical modeling. Elated by the opportunity to lie on the beach and simultaneously program a Basic model and eyeball a bikini-clad one, Ernie was overjoyed by Ecology's fluidity.

The winter months passed all too quickly in San Diego, and come spring Ernie and the swallows returned to their Capistranos. His ocean current model coded and checked out, Ernie flew home to Sophistication, Ark., and settled down to the programmer's bane, documenting both his program and his part of the research results.

Contract Quirk

Through a quirk in the contract, the only deliverable resulting from the research grant was the report. No one had thought things through enough, apparently, to realize that the programmed model itself was worth latching onto.

That was OK with Ecology, though, because it could hold onto the program and use it to contractual advantage on some future energy competition. As a result, Ernie's program was kept in low-profile status at contract windup time.

The plot thickens, right? There, sure enough, is an accident waiting to happen. And happen it did.

Fluidity strikes again. Both Ernie and his manager were swept up in the snare of an oil shale evaluation project at Cross Purposes, Wyoming, and off they went to the West.

Meanwhile, time was slowly ticking away on the valid account number by means of which Ecology was charged for file storage at Dial-a-Computer. And although Ecology didn't know it, its grasp on Ernie's model slipped further away with every tick of that acounting clock.

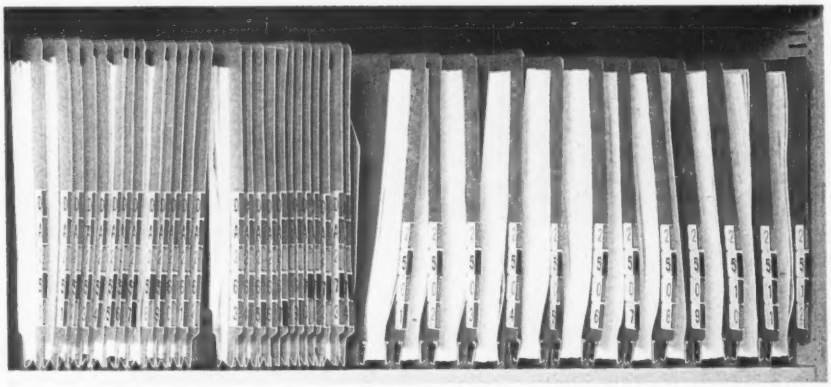
Of course, Dial-a-Computer sent a warning to Ecology, 30 days and then a week before the account number was to expire. But with none of the key players tending the homefront store, Ecology management could see no reason to keep the account open.

On Day Zero, like a flood pouring through a weakened dike, payroll data from San Diego's Maritime Market splashed all over the ocear. current model, obliterating every last trace of the valuable program.

Well, not quite every last trace. Consider the following data items:

- Fifteen days before the demise of the Dial-a-Computer file, a long-distance phone call

(Continued on Page 36)



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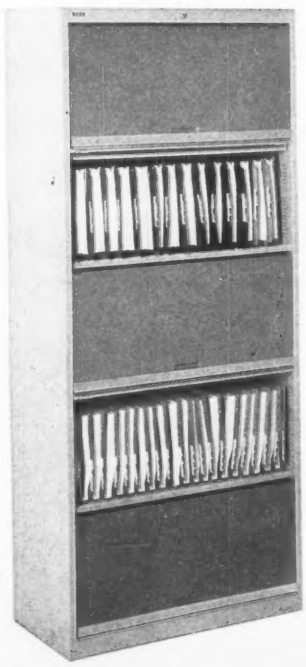

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READER COMMENTARY/Richard L. Kauffman

Challenges Ahead for Macro Processors of '80s

The Taylor Report "Macros to Change Outlook for Cobol in '80s" [CW, Oct. 22] was very welcome and perhaps overdue.

Predecessors to the Progeni package have been "raising the level" of Cobol programming for nearly a decade. Their granddaddy is Applied Data Research, Inc.'s Metacobol, operational on medium and large-scale IBM systems since 1970. Initially used to provide leverage in the Cobol programming environment through shorthands and debugging aids, the versatility of the macro processor has also been applied to translation between Cobol dialects, auditing for programming standards, supportings interfaces to DB/DC systems and so forth.

However, it was the "structured programming revolution" that vitalized macro programming for Cobol. After all, it did not take long for the new programming methods to stumble over Cobol's limited architecture and sentence structure. By 1974, Metacobol had supplemented conventional Cobol with structured programming features.

Using Metacobol, many organizations have used "proper" selection and repetition control structures to build more reliable and maintainable programs. In short, Metacobol was the first Cobol-level macro processor to raise the level of the Cobol language to meet today's programming problems.

Tomorrow's precompiler applications, however, may be quite different. The next ANS Cobol will support structured programming. Codasyl has already approved various "delimited scope statements" and both "explicit" and "implicit" scope terminators, all superimposed over today's sentence structure.

Metacobol supports these "official" structures now, so users can take advantage of future Cobol features before they are available in compilers.

This may not be enough. The new Cobol permits intermixing of the old (and "bad") language with the new (and "good"). It is, therefore, quite possible that the true challenge for the macro processors of the 1980s is to manage and control a gargantuan and compromised Cobol language.

Kauffman is Metacobol product manager for Applied Data Research, Inc. in Princeton, N.J.

'Good' Designs Mean Trouble

(Continued from Page 31)

be causing the trouble.

This problem has come particularly into focus with the Los Angeles District Attorney's attacks on Robert W. Bemer, reported in the Oct. 15 Taylor Report. Bemer didn't suffer any financial harm as a result of the DA's unjustified attempts to get $54,000 from him for the child support (the DA's office has withdrawn its claim). But he did realize that a beserk computer could cause people to have heart attacks, both because of the size of the resulting problem and because of the frustration in attempting to have matters put straight.

Look at the temporarily and permanently accurate field definitions in a support case situation, and notice how many virtues are on the side of the dangerous design type. For permanent accuracy, the record would have to include the children's birth dates; the court-order issue date and liability could be assumed after a search had found that no superceding event or lapse of time had either cancelled or modified the court order or otherwise affected Bemer's liability.

The fields would have had to be as follows: six characters for the court order date (MMDDYY), three characters for the court order number and six characters for the child's birthdate.

By contrast, the temporarily accurate record could contain just six characters for the court order number and two for the child's age.

There is no way an eight-character record will not seem superior to a 15-character version, even today. And when you look and see that in fact even this 15-character record system is incomplete (start and termination dates for each phase of the court order are assumed rather than given) the virtue of the apparent simple approach will seem more and more obvious.

Doing things right may not take much extra time, but any time at all will be begrudged in the race to get the systems up. Changing things afterwards would use such expensive resources that it would be unthinkable when the acceptance of a little bad publicity and a Band-Aid or two seems to cover matters.

The only practical way to stop the practice, then, is by education *before* those files are designed. And that involves teaching people to recognize danagerous file designs.

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DP No Longer Just a Support Function

(Continued from Page 31)

However, the search at this point was essentially a search for competent technicians. From management's point of view, the question was still "What do we want to accomplish with DP?"

DP professionals were little help to management in answering this question. Again concerned primarily with technical issues, they felt themselves being bypassed by the mainstream of business.

This phenomenon was not too surprising; DP was still viewed strictly as a support function, and its act was being controlled from without, not from within.

New Phase

The above is not meant to be a capsule version history of DP, only a highlighting of some trends which have significantly affected the people who work in the field. I do not mean to denigrate the progress of the DP profession.

Many of these problems are happily behind us. It seems to me, however, that we are moving into a new phase, one with a markedly different emphasis.

The concerns of the data processing profession as we move into the '80s will be to move from our traditional support role to an active management role. The skills called upon will be less technical and more analytic, more judgmental.

What are the factors pushing us in this direction? They are numerous and primarily the result of rapidly advancing capabilities and merging of technologies:

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- Microcomputers that bring sophisticated computing to many small business, home and personal users.

The questions facing systems professionals are no longer questions of capability — of the ability to implement ambitious data and communications systems. Rather, they are questions of efficiency, productivity and responsiveness of the systems we choose to develop.

The security blanket of technical complexity is no longer valid; the DP professionals of the '80s must address themselves to and align themselves with business goals and objectives. They must take an active role in planning and organizing corporate policy.

Sita is head of management information services for the Dartmouth Plan in Carle Place, N.Y., a financial services firm primarily involved in the home improvement financing field.

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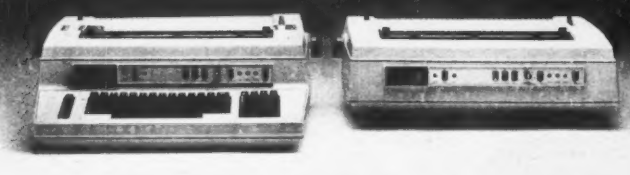

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The Tale Of a Program

(Continued from Page 34)

was made from Cross Purposes, Wy., to Clinker, Stocker and Soot Energy Co., a competitor of Ecology's. The charges showed up on Ernie's bill.

- Three days before the demise, a phone call was made from Cross Purposes to Dial-a-Computer, using a data link. Again, the charges showed up on Ernie's bill.
- One day after the demise, a large package containing punched cards showed up at the Clinker Stoker offices. United Package Service files indicate that it was mailed by Dial-a-Computer, but with a Sophistication, Ark., return address.
- And two weeks after the demise, a check stretching into five figures was deposited in a newly opened Cross Purposes bank account in the name of Diego J. Capistrano. It was signed by the comptroller at Clinker Stoker.

Well, that's the end of the story. Ecology lost the program, of course. "Damn," Ernie's manager said to him, "one of us should have saved that model."

Ernie, for his part, mostly lived the same old life style, although his friends did wonder how he and his wife financed the purchase of a 125-year-old mansion.

Two Firms Cooperating

Package Matches User Views, Data Base

By Tom Henkel
CW Staff

CAMBRIDGE, Mass. — Claiming to have found the key to effective data base design, two software firms recently announced plans to join forces to market what they call a complete design package.

MSP, Inc., the vendor of Datamanager, a data dictionary package for IBM 360 and 370 users, will assume the marketing rights to a product developed by Database Design Corp. (DDC). Called Data Designer, the package is billed as a tool that uses Datamanager and color graphics — when available — to get users involved in data base development.

At the MSP-DDC briefing, DDC Chairman James Martin said many data base projects fail because the people who really know the data — the users — are never asked to contribute ideas when the data base is being designed. Some data base administrators claim it takes too long to explain technical complexities to users.

The Data Designer facilitates the iterative steps in the design process. In the validation phase, for example, it compares the contents of a dictionary file of organizationally accepted data elements to a file of what, in the end user's view, is needed for the application under development.

Discrepancies are noted by the system and resolved, in theory, by the data base administrator. After that, the Data Designer generates reports that describe inherent data relationships.

These can be highlighted with color graphics, but are quite clear even if "black-and-white" is all that is available.

The reports can be directed to CRT terminals or to hard-copy plotters. The analysts and users can then review the proposed design and approve it or make changes or corrections and return to the validation phase.

Data Base Designs

In addition to the reports, the package creates "third-normal-form" designs — generally considered the most stable data base designs — which are independent of any data base management system. Total traffic and response time weights are also shown for performance analysis, the company said.

Data Designer can reportedly reduce development time two to three months and lower the personnel costs needed to use a data base management system.

An interface linking Data Designer with Datamanager is expected to be announced in January. Future interfaces linking Data Designer with other data dictionaries are possible.

Data Designer was built specifically to operate with California Computer Products, Inc., Tektronix, Inc. and Zeta Research, Inc. color plotting systems. However, DDC will provide interfaces to link Data Designer with almost any plotting system, Holland said. He added Data Designer will also work with noncolor graphics hardware.

Data Designer costs $12,000. Datamanger costs between $8,100 and $55,000. To date, no arrangements have been made to offer Data Designer as a package deal with Datamanager. However, the vendor said there is a possibility of a package deal in the future.

MSP is at 21 Worthen Road, Lexington, Mass. 02173

Software Directory Extended To Provide More User Options

INDIANAPOLIS — Prospective buyers of software packages have become more knowledgeable, and a directory that offers facts about nothing but packages has to be updated. That is the rationale behind the plans of International Computer Programs, Inc. to expand the *ICP Software Directory* in both content and number of volumes and to rename it *The ICP Directory*.

Another volume to be added to those already published will provide background material on vendors serving the "information product and service" marketplace. Previously, ICP provided nothing in this regard except vendor names, addresses and phone numbers, with data such as the number of copies of a product installed provided only if the vendor wished to divulge it.

The ICP Directory: Information Product and Service Suppliers will follow the pattern of the other books that now make up the directory and will be published twice a year, in December and July. The first issue is expected to be out next month.

Starting next year, in addition to listing software packages, the directory will include information on offerings of custom programming firms, data centers, turnkey system vendors, consultants, minicomputer OEM distributors, educational sources and other services in which the essential added value lies in software, according to the editor, Dennis Hamilton.

Systems available from remote computing service and time-sharing vendors are already included in the directory, but in a "very low-key way," Hamilton said.

Coverage of that segment of the information product and services area "will certainly be heightened" in the expanded publication so that users will have a broader view of all the alternatives available to them, he added.

Traditionally, the directory has contained information on software products available from any

(Continued on Page 41)

On-Line Support Becoming Trend?

NORWALK, Conn. — There may be a trend developing to provide users of system software packages with direct, immediate support, no matter how far the user site is located from a vendor branch office.

Recently announced by Turnkey Systems, Inc. (TSI), Release 2.2 of the Task/Master teleprocessing monitor provides users with a facility that puts their installations on-line to TSI's service center for diagnoses of problems.

The updating also supports a system simulation package to test the ability of the user's configuration to handle various workloads in a multithread/multitasking environment. It also supports an enhanced statistics package, operator performance statistics for the data entry feature and other modifications that improve system stabilty and ease of use, a spokesman said.

Major Enhancement

But the Remote Diagnostic Facility is the major enhancement of the release: It allows memory dumps to be requested by and transmitted directly to the TSI technical support center, where analysts can go to work on the problem.

At a simpler level of support, TSI has announced an "express service" for resolving critical system problems. Under this plan, reports of such problems will get priority handling rather than being added to the list of whatever problems are already on hand, the spokesman said.

In effect, this will heat up the "hot-line" support the center already provides, he added. It recognizes that there are differences in the criticality of problems and that some have to be handled promptly, regardless of when they are received or what backlog may be ahead of them.

TSI is at 50 Washington St., Norwalk, Conn. 06854.

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May Avert DBMS Decision

Available Data Bases Meeting In-House Needs

Special to CW

Over the past several years, the widespread proliferation of data bases has made information readily available to researchers and businesses on a subscription basis. Moreover, the use of these data bases has been immeasurably increased by the nationwide availability of on-line retrieval systems offered on a per transaction basis by several information management companies.

The trend is inevitable, according to George E. Mueller, chairman and president of Systems Development Corp.

"Business and government in general, and research in particular, depend upon a steady flow of information. In today's world, gathering and disseminating all that information is far beyond the means of any single library — or of the federal government, for that matter," Mueller said.

The computer-based network may well provide an answer to that dilemma. With this distribution resource, available from the information management companies, many specialized data bases can be prepared efficiently by relatively small organizations.

Compiling useful data bases becomes an economically attractive business when costly marketing and distribution functions are handled by one or more of the on-line retrieval services. With a large, ready-made market available to them, data base suppliers have increased in number and expanded the scope of their data bases.

Today, there are hundreds of data base suppliers operating effectively and profitably throughout the country. These suppliers range from universities to federal agencies and from tiny abstracting companies to industrial giants such as Bell and Howell Co.

The data bases cover a wide range of information, including science, technology, social science, business and government. Most are highly specialized, carving out their particular niche in the market.

In a relatively narrow field there are relatively few data bases. In huge markets such as energy, conversely, there are a large number of data base suppliers. Indeed, the American Petroleum Institute prepares not one but three data bases. The university of Tulsa prepares a data base called Tulsa that covers natural gas, synthetic fuels and alternative fuels in addition to petroleum. Energyline, prepared by the Environment Information Center, Inc., concentrates on economic and environmental aspects of energy development.

Data Base Index

There is, of course, considerable overlap between data bases, particularly those aimed at a specific industry such as energy. The overlap has reached such proportions, in fact, that one of the leading information management companies, SDC Search Service, has developed a Data Base Index that enables users to blanket a subject.

The Data Base Index tells a user which of the 65 data bases on the SDC system information on the subject being studied. Since all the data bases are indexed in the same way, a user can ask the same questions of all data bases identified by the Data Base Index and thus quickly perform the most comprehensive search possible.

The data base prepared by Chemical Abstract, Inc. covers a broad spectrum of chemical industry literature and is by far the largest currently on-line commercially. It probably will not remain so for long, however. Bell and Howell's Newspaper Index started in 1976, is updated monthly with 100,000 citations from major newspapers across the country.

Size is by no means the only criterion for effectiveness in a data base, however. The tiny SAE Abstracts data base only adds 800 citations a year, but it is the electronic bible of the automotive industry.

Available Services

Access to all these data bases in provided on-line by broad-based vendors such as SDC Search Service, news services such as the *New York Times* Information Bank and legal file services such as Mead Data Central. A using company or research organization can subscribe to any or all of these services and access them with the same equipment.

With simply a standard non-intelligent terminal and a coupler, a user can up one of the services and conduct the search from his office. The services, with few exceptions, only charge for actual computer-connect time and any off-line printing requested.

The data bases themselves are stored in the service's data processing centers. The data base suppliers provide the data bases and the periodic updates on magnetic tape, and the service reformats them and stores them on disk. Considerable processing power and capacity are required.

In the case of SDC Search Service, an Amdahl Corp. 470V/7 and 32G bytes of storage are used to store and access the company's files, which contain 25 million citations.

Some data bases such as Newspaper Index and Promt provide summaries of the news items and statistics, and others such as Crecord and Fedreg summarize the material in, respectively, *The Congressional Record* and *The Federal Register*. Most data bases, however, provide primarily bibliographic references. The user must then procure the source document or documents he uncovers in his search.

To meet this need, a number of fulfillment services have sprung up around the country. These fulfillment services accept orders from users and mail the requested documents to them.

Last year, SDC Search Service added a document delivery service to expedite the fulfillment process. With this service, a user can order a document directly from his terminal. The SDC computer will route the order to the appropriate fulfillment service, thereby eliminating mail delays.

As the use of on-line search services has spread across the country, communications alternatives have been developed to reduce line charges. Users of several services, for example, can dial a local number and access the data bases using either the Tymnet Inc.'s Tymnet or Telenet Communications Corp. Telenet services.

Clearly, the subscription data base industry is still in its infancy. New data bases are being developed, and new companies are entering the field. It is probable that many private data bases will become available in the future as well; companies that have developed data bases for their own use can derive revenue from them by making them available through one or more of the on-line search services.

While there are questions of corporate policy regarding confidentiality to be resolved, these potential revenues are likely to be too tempting for many corporations to turn down.

Then, too, there are signs that the government's vast store of information will be made increasingly available to the general public.

Option Aids 'Easytrieve' File Handling

OAK BROOK, Ill. — The Extended File Processor (EFP) was recently announced for Pansophic Systems, Inc.'s Easytrieve information retrieval system.

Designed for IBM 360, 370 and compatible mainframes, Easytrieve enables users to select records, perform calculations, sort data and format reports through a free-form command systems.

The package can be used for such DP-specific operations as job accounting under DOS or OS, DP auditing and SMF data analysis.

The EFP option allows users to sequentially retrieve records from any number of files; output records to any number of sequential files; batch Easytrieve jobs; create Isam/Vsam files; and insert, delete or modify records, a Pansophic spokesman said.

EFP also supports the linking of individual procedures so that, for example, a programmer can now write "a complete system at one time, on one sheet of paper in one program with one set of JCL," the vendor claimed.

The EFT option costs $6,900 for OS users and $5,900 for DOS users. Easytrieve costs $18,500 on OS and $14,500 on DOS, the vendor said from 709 Enterprise Drive, Oak Brook, Ill. 60521.

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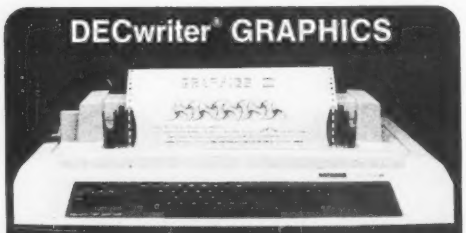

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ROCKVILLE, Md. – The Automated Financial Information System (Afis) software now available from Doty Associates, Inc. runs on Wang Laboratories, Inc. 2200 small business systems to help companies under contract to the U.S. government comply with auditing requirements. It also provides tools for better management, a spokesman said.

Modular in implementation, Afis includes support for one to four application areas: labor scheduling; job cost accounting; planning and projections; and payroll accounting. As many as 599 employees and 269 contracts can be entered in the job scheduling routine, the company noted.

All options of the labor schedule are included in the job cost ledger. In addition, other nonlabor costs may be entered against contracts, as well as a period closing summary and a cumulative contract status report, the spokesman said.

Afis ranges in cost from $2,900 to approximately $10,000 depending on options selected. The vendor is based in Suite 434, 416 Hungerford Drive, Rockville, Md. 20850.

System/34s Linked

CLEVELAND – An electronic mail package for IBM System/34 users is available from Cosmo Software, Inc.

The Extended Message System can transmit full-screen messages to up to five System/34 workstations simultaneously. Messages can also be sent to remote locations, a Cosmo spokesman said.

Messages can be as long as 1400 characters, spread over 20 lines, and can be reviewed by both the sender and recipient. Users can access the messages at any terminal connected to a common CPU.

The messages can be printed immediately or held for later printing, the spokesman noted.

Although IBM does not offer an electronic mail capability as part of its operating system, a Cosmo spokesman said his firm felt there is a wide applicability for the package.

The Extended Message System costs $99 per CPU for a one-time licensing fee, Cosmo said from 3239 W. 14 St., Cleveland, Ohio 44109.

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Text Editor Package Aids Specifications

CAMBRIDGE, Mass. — Software to support interactive text editing on virtually any CPU with a Fortran facility is now being offered by Multisystems, Inc. The package is particularly useful for creating and updating construction or other specifications, a spokesman said.

The Porta-Specs software enables the user to enter the paragraphs and subparagraphs needed for that sort of work and then to maintain and correct them on-line before printing them in one or more formats, all under user control, the spokesman explained.

While Porta-Specs provides most of the common text editing facilities — paragraph repositioning; margin justification; page numbering; page headings and trailers; and phrase options — it also supports control over what might best be described as "nested paragraphs." As many as six levels of nesting can be defined, with different instructions applied to each.

Moving Blocks

This facility is not intended just to support simple tasks such as indentation or change in type font, the spokesman emphasized. Rather, it enables the user to manipulate whole blocks of paragraphs, or portions of the larger blocks, to create the optimal, documented output.

Coupled with the conventional facilities, this support for nested paragraphs provides the means of generating complete hierarchical specifications or outlines of the complete documentation which might serve as tables of contents or summaries for those who would not ordinarily receive the full text.

Porta-Specs costs $6,500 regardless of the user's hardware/software configuration, Multisystems reported from 1050 Massachusetts Ave., Cambridge, Mass. 02138.

'TMX-11' Enhanced

CAMBRIDGE, Mass. — TMI Systems Corp. has announced an enhanced version of its Transaction Management Executive (TMX-11), which runs with Digital Equipment Corp. PDP-11s under RSX-11M.

The basic package supports on-line operations in a high-volume, time-critical processing environment; multiple remote terminals performing data entry and query tasks; heavy data base work requiring immediate access to multiple files; and CPU-to-CPU communications, a spokesman reported.

TMX-11 is said to provide buffer management, transaction queuing, task scheduling, error reporting and external device interfaces, including emulation of a buffered CRT when using DEC's VT52 terminal.

Users of Version 2.2 will note enhanced performance along with a more compact size, the spokesman said. The update has been adapted to operate with RSX-11M Version 3.2 and support DZ-11 multiplexers and VT-100 terminals, he added.

TMX-11 costs $40,000 from the vendor at One Broadway, Cambridge, Mass. 02142.

Directory Expanded

(Continued from Page 37)

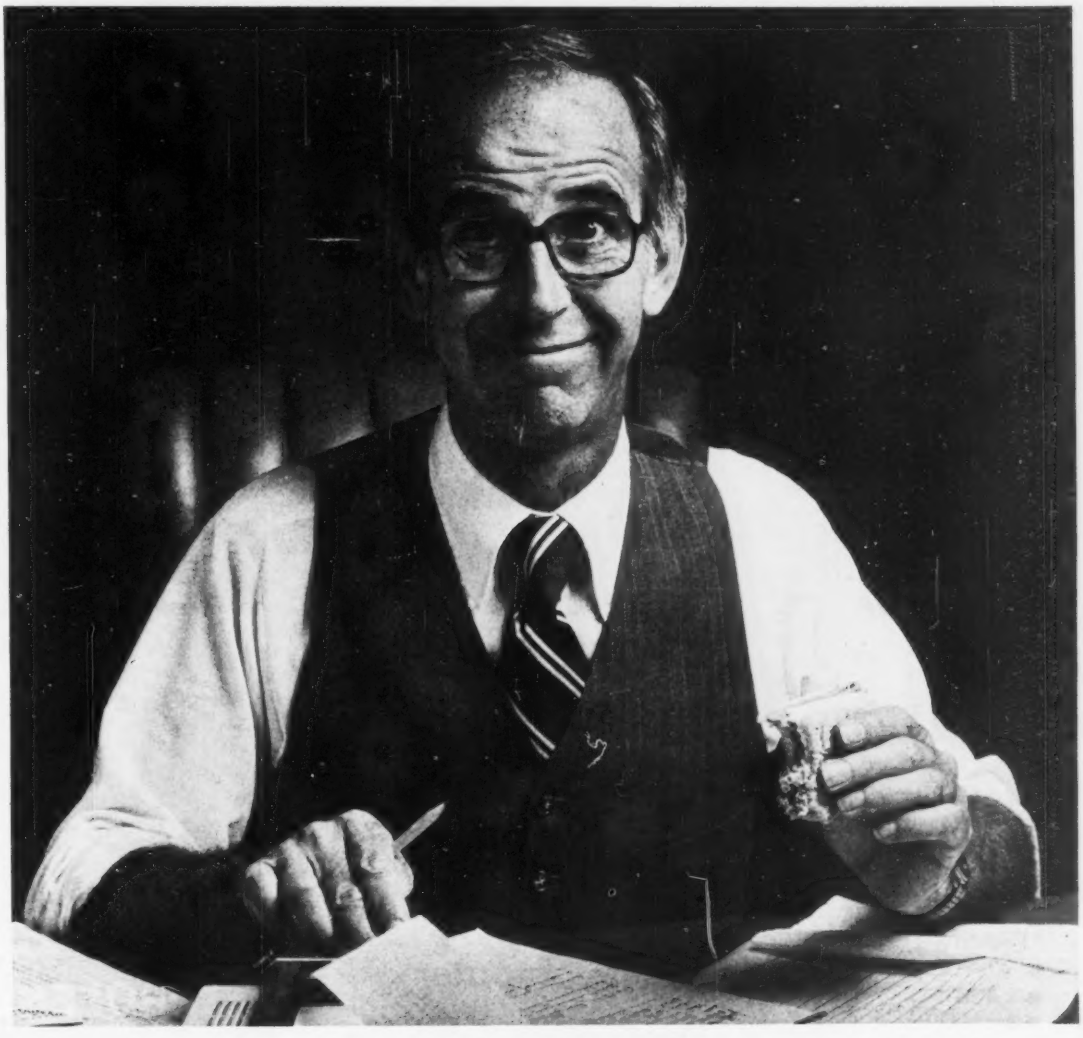
source, ranging from IBM to the legendary programmer working in his garage over the weekend.

This year, more than 5,000 products from 1,200 vendors are listed. The directory got so big that ICP broke it into five volumes, updated semiannually.

Each of the original, but now expanded, five volumes of product listings costs $65/year, but subscribers ordering more than one at a time get a 20% discount on the total order.

The sixth volume, the vendor catalog, costs $125/year, but the 20% discount applies if it is ordered with at least one other volume.

All six volumes of *The ICP Directory* are available for $360/year, Hamilton noted from 9000 Keystone Crossing, Indianapolis, Ind. 46240.



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For Auditing? For Security?

Your DBMS: Is it 'Environmentally Obsolete'?

By Lewis A. Myers Jr.
Special to CW

If your data base management system (DBMS) has been in use for more than two or three years, it may be approaching environmental obsolescence.

How and why does such a situation occur? Certainly at the time the DBMS was purchased it was evaluated, possibly benchmarked against other DBMS and finally judged to be the best solution for the task at hand. Perhaps the environment in which the DBMS must operate has changed in such a way that the DBMS package, while still technically sound, has become environmentally obsolete.

One reason for this obsolescence is the increasing level of DP technical knowledge possessed by DBMS users ranging from the inventory clerk, whose workstation includes an interactive terminal, to the external auditor who has ventured on site for an unscheduled financial audit. Security and auditability are two features of the DBMS that can be affected by the increasing level of technical expertise possessed by persons other than DP professionals.

Maintaining Security

Just a few years ago, the maintenance of the security of the information contained in the data base depended heavily on the naivete of the user of the on-line interactive DBMS. Today, that same user must be assumed to possess a sophisticated knowledge of high-level languages, operating systems and hardware.

If controlled access to terminals or password requirements at terminal sign-on is the only protection your data base has from unauthorized updates, then the security of information in your data base may be suspect.

To evaluate properly the security of the data base, one must consider the need for password protection of individual data elements and possibly even data encryption. An improvement on simple password protection at sign-on could be the requirement for password protection of updates to individual data elements in the data base.

Element password protection can prevent, for example, the inventory clerk from altering his own payroll record, while conversely preventing the payroll clerk from updating inventory records. The encryption of data, usually associated with transmission security, could thwart the person who would violate DBMS security by simply bypassing the DBMS software and directly accessing on-line data.

The DBMS package that provided adequate security several years ago must be closely examined for weaknesses that have emerged in the DP environment. If it is found that data element password protection or data encryption is desirable, but the DBMS cannot provide this capability, you may be witnessing the first state of environmental obsolescence.

A few years ago, a financial audit consisted of reconstructing and reconciling accounting transactions up to the moment data was entered into the DBMS. The auditor would deftly step around the computer to the peripheral output device, pick up the printed or punched output and continue with the audit, all the while assuming the integrity of the information was preserved while in transit in the DBMS.

Today, the auditor, like the user, has moved from a level of DP naivete to a sophisticated level of hardware and software knowledge. The ideal solution to auditability of data base contents and DBMS transactions is to include the auditor in the initial design and implementation of the DBMS.

Involvement of the auditor in the development of the system from the ground up is of course not feasible in many DP installations. Another solution to enhance auditability, while less strict in details, is perhaps more practical for the auditor and for DP management. This method requires that the DBMS have a capability for auditing through the computer.

Either of two methods of auditing transaction processing through the computer are suggested. The first method consists of the parallel testing of DBMS transaction processing and transaction processing performed by generalized audit software provided by the auditor.

This parallel auditing includes the processing and storage of all types of DBMS transactions, once through the normal production system and once through the audit software package. The auditor using this method compares the results of these parallel runs for consistency and accuracy.

ITF More Practical

The obvious limitation of parallel auditing is the machine time required for parallel runs. Perhaps a more practical method for auditing through the computer is the capability of the DBMS to support an integrated test facility (ITF). The ITF includes a complete set of dummy employee, customer and department records against which normal DBMS transactions can be processed.

The auditor performs his evaluation by inserting ITF transactions he has prepared himself into the daily production jobstream. The auditor then can review the results of the ITF transactions after they have processed through the system integrated with the normal mixture of daily production transactions.

The audit through the computer is considered complete once the auditor is satisfied his ITF transactions have been correctly processed by the DBMS. The DBMS supporting an ITF must be flexible enough to handle ITF transactions intermixed with normal production transactions, while maintaining independence between the ITF file and the production files.

The DBMS package that was satisfactory for an audit *around* the computer a few years ago may be approaching environmental obsolescence if it is not easily adaptable for auditing *through* the computer today.

The solutions to the problems of security and auditability are not simple and in some degree are unique in each DBMS installation.

Myers is a Ph.D. candidate in the Department of Management at the University of Texas in Austin.

Altos Microcomputer Gets Accounting Package

FARGO, N.D. — A fully integrated accounting package already implemented on Digital Equipment Corp. PDP-11s, Alpha Microsystems AM-100s and Pascal Microengines, has been adpated to the business-oriented microcomputer introduced by Altos Computer Systems, Inc. last spring, according to a spokesman for P.S., Inc.

The heart of the accounting system is a general ledger module that allows the using company to name and number more than 1,000 of its own accounts and to generate financial reports for individual profit centers as well as for the entire operation.

Tied into that module are others that handle accounts receivable, accounts payable, order entry and inventory control. The "payables" routines support aging of accounts and cash requirements reporting, the spokesman noted.

The package is a single-entry system which is menu-oriented to simplify both training and use. Once data is input, the software updates all appropriate files, he said.

The software and appropriate documentation cost $2,995. The user manual is available separately for $25 plus $2 postage, from P.O. Box 2017, Fargo, N.D. 58107.

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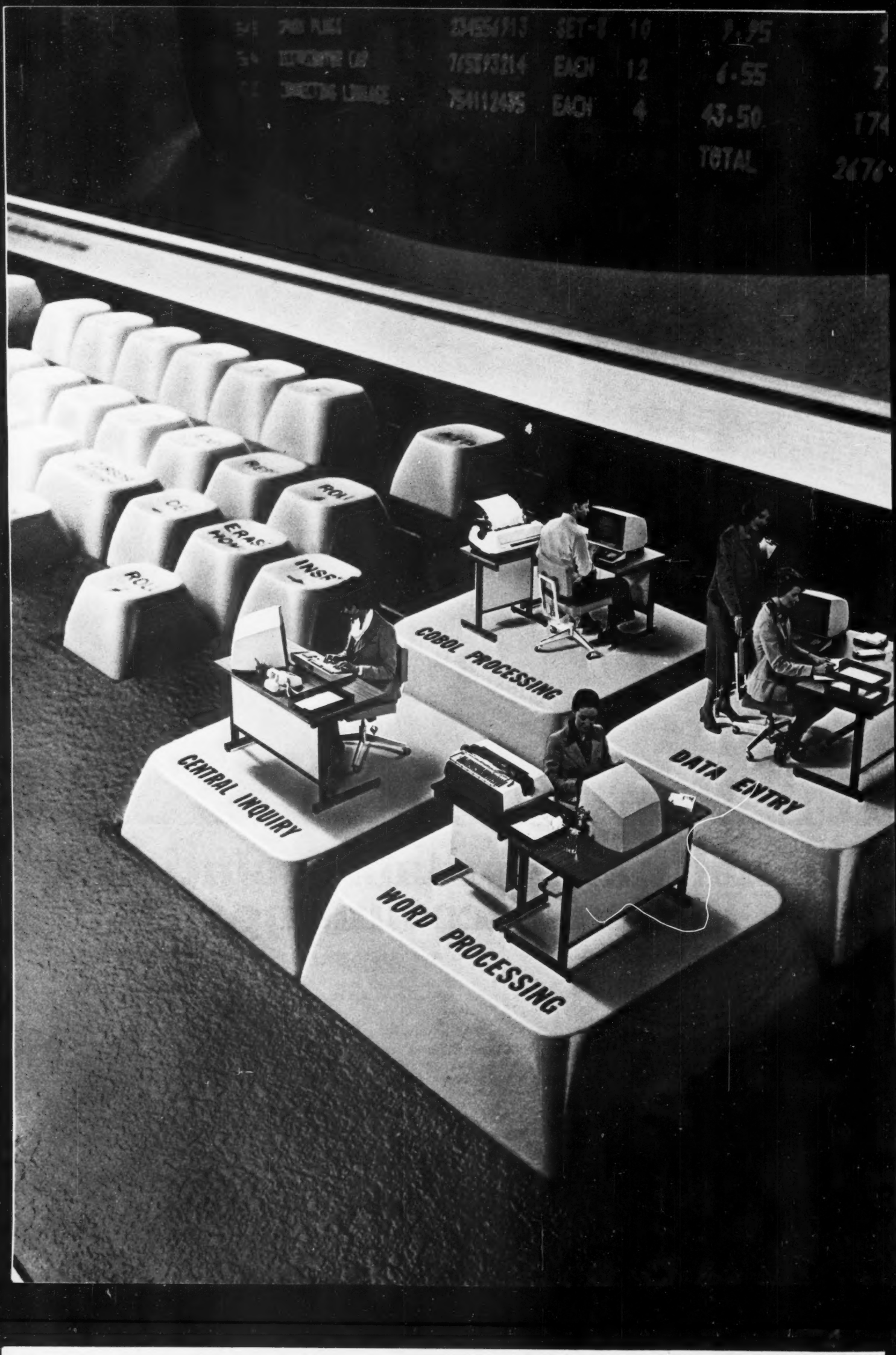
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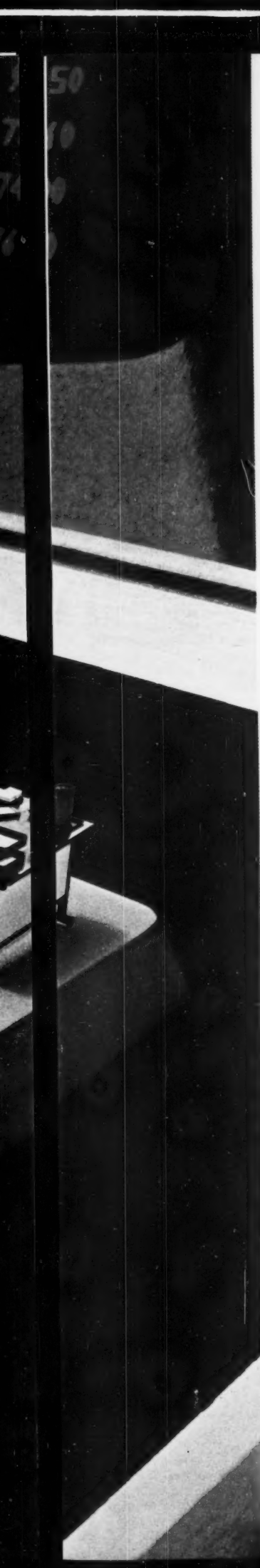

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Human Engineering Flaws Create Software Problems

By Dave Fafarman
Special to CW

In an editorial last spring, *Computerworld* referred to software as "an Achilles heel," pointing out the potential seriousness of software "bugs" when these affect the design of nuclear power plants (and, by inference, in other critical applications as well). I think I have observed the causes of the problem sufficiently to offer some solutions.

It is a generally accepted principle in industrial engineering that even apparently trivial design changes in the human engineering of machine tools, for example, can have a large impact on operator fatigue and error rates. Yet evidently this concept has seldom been extended to the software development environment.

A related, often overlooked problem is the complex interplay of weaknesses in software design and documentation with user error. For example, if a user makes a logical inference about a program's undocumented or unclearly documented behavior and finds an error path instead, then that has the same effect as a bug, even if technically the program was written to specification.

What, then, are the needs for human engineering of the software development shop? I recommend the following hardware:

1. An interactive terminal dedicated to the individual programmer. For graphics software, this should be a graphics terminal (even if the ultimate target is a drum or flatbed plotter).
2. Access to a line printer less than 50 feet away (which may be shared).
3. Adequate disk space.
4. Low error rate communications lines, which must also be separate from the programmer's main voice communication line.
5. Convenient listing files and/or a mechanical, electronic or human "listing librarian."
6. Compatible character sets up and down the line.
7. A reasonably stable hardware configuration.

Software Necessities

As for software, the following are necessary:

1. A compiler language, a system editor and other utilities which support the programmer's wishes with the most direct and explicit coding sequences. Tortured, circumlocatory constructs are the single greatest source of bugs.

For instance, the 1966 Fortran IF statement had the form of "IF (logical test) perform operation #1." Straightforward syntax — so far so good.

But suppose a second operation is desired, as in "IF (logical test) #1; #2." To handle this, the programmer had to code the Boolean algebraic contradiction of his original intent, as well as set up an irrelevant label, as in "IF (.not.logical test) GOTO 100; #1; #2; 100 CONTINUE."

In this sense, Fortran, a supposedly higher level language, was even weaker than its generated object code, which is at least *consistent* in using the same GOTO regardless.

2. A main programming support (for example, the Fortran compiler) which brings together — in one place (often on one sheet), in a totally human-engineered form — a listing that shows the following at a glance:

A. Program structure.
B. Program source statements.
C. Compiler informative and fatal diagnostics.
D. A program reference map (at least as good as Control Data Corp.'s R=2 map).
E. Most recent revision history.

I believe I have come the closest to actually implementing the above, compared with packages I have seen.

3. An editor and a compiler that are aware of each other's existence and that incorporate some mutual adaptions.
4. Convenient and comprehensive operating system calls from inside an application program.
5. A symbolic interactive debugger.
6. Automatic traceback by source code line number, called consistently by system library routines in case of error and also callable by the programmer.
7. TRACE and CONDITIONAL TRACE. These are somewhat similar to, but for most purposes better than, CDC's Fortran DEBUG. As with so-called structured programming aids which, when well implemented, add the new dimension of structure to a programmer's understanding of an algorithm, TRACE adds the dimension of time to that understanding.
8. The CHARACTER data type, such as is implemented in the 1978 ANS Fortran standard. Since nearly all communication, in both directions, between people and computers takes the form of character data, the utter clumsiness of earlier Fortran in handling it accounts for no small measure of problems.

The potentially revolutionary implications of the CHARACTER data type of Fortran coding style should not be underestimated — major improvements can result in the areas of input syntax analysis (command interpreters), output report generation, macro definition and the use of character variables and constants to replace integers and logicals (so as to enhance program readability, internal documentation and the usefulness of interactive debug).

The CHARACTER data type will also make it possible to write simple, portable editors and preprocessors.

9. Good subroutine libraries appropriate to the task at hand, together with a librarian utility.
10. RUNOFF software for preparing documentation (and other printed material) with a minimum of hassles. In more sophisticated shops, the same files can be adapted both for preparing hard-copy documentation and for program internal help and error messages.

With the availability of the above tools, we can expect to see not only far fewer bugs, but also shorter program development cycles, easier maintenance and enhancement and even reduced size of both program source and object code.

Fafarman, currently a senior engineer with EDS Nuclear in San Francisco, has 13 years' experience in engineering software on several different systems.

With Increasing Use of Touch-Tones

Voice Response Pay-By-Phone Matures

By Paul Ayres
Special to CW

The concept of data entry via voice response pay-by-phone has come into its own. This computer-based technology has proved especially attractive to banks as a means of eliminating time-consuming manual procedures, enhancing customer service and projecting a progressive image.

Voice response is an especially economical way of effecting a pay-by-phone system since it allows the telephone's Touch-Tone pad to function as a data entry medium. A customer can call up his bank on a Touch-Tone phone and enter, via the Touch-Tone pad, his account number, identification code, the identification codes of merchants whose bills he wishes to pay and the amount of payment.

One vendor's voice response unit converts the tones generated by the telephone keypad into a digital stream that can be processed by the computer. The unit also converts the output back into spoken words by choosing from a vocabulary stored on disk or programmable read-only memory.

That unit leads the customer through the pay-by-phone procedure, confirms numbers and amounts and acts as the interface between the customer and the bank's DP system. With the unit, a bank can eliminate the time-consuming procedure of having a teller collect information and keypunch it before entry into the computer.

Banks have quickly seized upon the many benefits which attend a voice response pay-by-phone system, such as around-the-clock customer service and the potential for gaining the accounts of merchants whose customers use pay-by-phone. However, the customer base for voice response was small in the early 1970s because of lack of Touch-Tone telephones. In 1973, only 15% of phones in the country had been converted to Touch-Tone.

'The quality and reliability of the . . . voice response system has helped us maintain and enhance our technology leadership position in our market area.'

But Touch-Tone penetration has greatly increased in the past few years to about 60% of installed phones. As a result, the use of voice response in pay-by-phone is undergoing a resurgence.

The Union Commerce Bank, Cleveland's fifth largest bank with assets of $1.3 billion and 37 branches, has had a very successful experience with a pay-by-phone system formed with Wavetek Data Communications ADC1500 voice response unit. After 18 months in operation, the performance of the pay-by-phone system has exceeded all our expectations.

We set up a pay-by-phone system manned by tellers working at CRT terminals in December 1977. The following May, the bank's employees began operating Wavetek's voice response system, which

(Continued on Page 54)

FCC Asks Comments on Plan To Reduce Carrier Regulation

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The Federal Communications Commission (FCC) has released details of a plan to stimulate new communications services.

The commission basically wants to reduce the regulation of carriers that compete with AT&T. Under the plan, those carriers would no longer be required to submit voluminous cost data to justify proposed tariffs.

For example, rates could be filed 14 days before their scheduled effective dates, rather than the 90 days required under the present rules. New services could be implemented without prior authorization if they employed existing circuits and facilities.

The carriers affected by the proposed changes lack significant power to control the telecommunications market, so reduced regulation is unlikely to give them an unfair competitive advantage, the FCC explained.

If the FCC's proposal is adopted, 10 pending cases involving nondominant communications carriers could be settled immediately, the commission indicated, saving money for the carriers and freeing FCC staff members for other chores.

The FCC's plan was almost certainly inspired — at least partly — by the effort now under way in Congress to update the Communications Act of 1934. The major aim of the proposed revisions is to reduce government regulation of competitive telecommunications services.

Conceivably, the FCC could bring about that change if no legislation is enacted along such lines.

The commission is soliciting comments on the plan to cut red tape from the tariff application procedure. Comments are due by Jan. 25 at the FCC, 1919 M St. N.W., Washington, D.C. 20554.

Details Given on DG's Xodiac

WESTBORO, Mass. — Data General Corp. has described its recently unveiled Xodiac network management system as "a series of modular data communications software products that, taken together, embody an intersystem philosophy."

With the Xodiac concept [CW, Nov. 12], users of one DG Eclipse minicomputer can communicate with other Eclipses "on a transparent basis and in an orderly and facile manner," the vendor claimed.

Xodiac is based on DG's Advanced Operating System (AOS) X.25 communications protocol. That, in turn, is based on the multiprogramming AOS that supports the Eclipse series — made up of DG's five largest interactive minis.

According to a DG spokesman, Xodiac's architecture is composed of modular subsystems that can run in Eclipse systems under AOS without disrupting network functions. "The architecture provides a transparent interface which allows resources on remote AOS-based Eclipse[s] to operate as if they were in the same location as the local system," he explained.

The Xodiac group of software products includes AOS X.25, a connection protocol; AOS Resource Management Agent (RMA); AOS Virtual Terminal Agent (VTA); AOS Network Operator Process (Netop); and

(Continued on Page 48)

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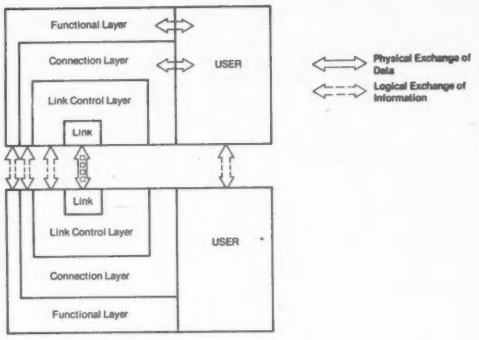

With the CCITT X.25 protocol, levels 1, 2 and 3 are called link level, frame level and packet level, respectively; with AOS X.25, those levels correspond to the physical link layer, link control layer and connection layer, respectively. Xodiac also has fourth layer, the 'functional layer,' not applicable to CCITT's X.25 structure.

Xodiac System Links Eclipses

(Continued from Page 47)

AOS Network Generation Program (Netgen).

Xodiac's physical link layer includes the hardware used for intersystem links; the link control layer is the software interface to the physical link level. Various device drivers in AOS are said to comprise this second layer.

The connection layer is implemented as logical extensions to AOS and a separate AOS X.25 manager process, the spokesman explained. Users can access this third layer directly to establish connections between AOS systems using AOS X.25 or connections to DG systems under the vendor's RDOS, RTOS and Disk Operating System as well as the RDOS X.25 protocol.

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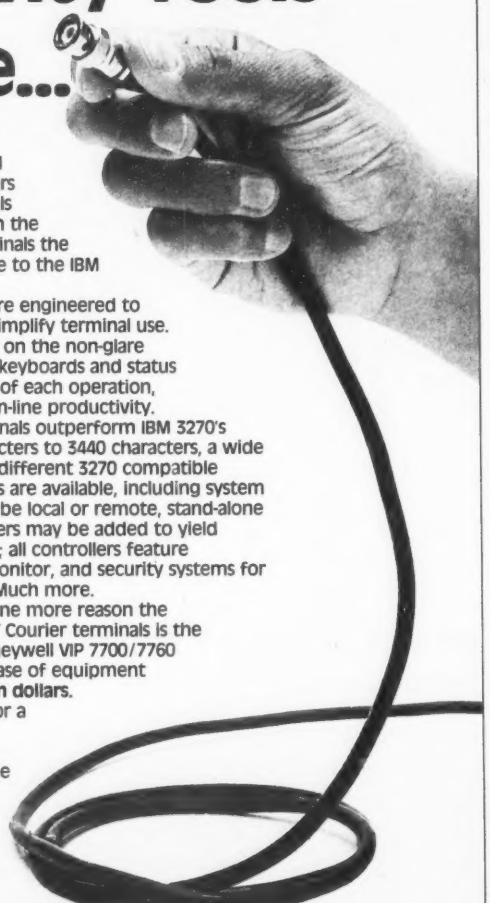

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Data Briefs

Guide Gives Details On 500 CRT Terminals

LEXINGTON, Mass. — A reference guide to 500 monotone and multicolor CRT terminals is available from GML Corp.

The "Display Terminal Price Index" was compiled to provide a quick analysis of available systems. Terminals are sorted according to their prices, which range from $400 to $130,000.

Descriptions include model and manufacturer, CRT capacity and type of capabilities, with special indicators for color units and OEM cost discounts.

The index categorizes terminals into six types: full graphics, intelligent, partial graphics, word processing/-editing, alphanumeric and numeric.

The 16-page booklet is available for $9.50 prepaid or $14.50 billed.

Users who need complete specifications for the terminals contained in the index can get that information in GML's "Computer Terminal Review", the firm added from 594 Marrett Road, Lexington, Mass. 02173.

Lear Siegler CRT Terminals Gain Business Graphics Ability

ANAHEIM, Calif. — Business graphics capabilities are now available that give Lear Siegler, Inc.'s ADM-31 and ADM-42 CRT terminals the ability to produce graphics elements such as bar charts and customized business forms.

Operators can use more than 10 graphics characters, such as corners, t-bars, crosses and vertical and horizontal lines, to make up charts that illustrate sales forecasts, marketing research data and financial plans.

The graphics option costs $100, Lear Seigler said from its Data Products Division at 714 N. Brookhurst St., Anaheim, Calif. 92803.

Wand Reads OCR-A For NCR's POS Terminals

DAYTON, Ohio — A hand-held optical character recognition (OCR) reader is available from NCR Corp. that reportedly speeds data collection for NCR cash registers and point-of-sale (POS) terminals.

The NCR 7887 hand-held OCR reader is a pistol-grip unit attached by a 10-ft cord to a microprocessor-based control unit, programmed to read standard National Retail Merchants Association OCR-A characters.

The reader is compatible with the NCR 250, 280, 255, 2552, 2140 and 2150 families of POS terminals and can be used with the NCR 2950 general-purpose terminal. It is programmable for a wide variety of standard and special formats.

Users can make limited format modifications — such as field length changes — by passing the reader over special programming symbols, NCR said. Check digit verification is also featured.

An audio-visual feedback system verifies entries and indicates invalid reads.

The wand costs $995, including installation, with an additional one-time charge for format customizing. NCR is at 1700 S. Patterson Blvd., Dayton, Ohio 45479.

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COMPUTERWORLD
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For Engineering, Word Processing

Net Gives Utilities Firmer Control of Data

By Jay Woodruff
CW Staff

ATLANTA — A combination of five computers, central and remote network processors and the availability of spare network processing parts keeps a data center here in firm control of data for four large electric utility companies in the Southeast.

Southern Company Services, Inc. (SCS) is based in Birmingham, Ala., and provides DP and other technical services to its parent firm, the Southern Company, and to its four utilities: Alabama Power, Gulf Power, Georgia Power and Mississippi Power.

Its network, based here in its Atlanta office, includes a pair of cross-connected Digital Communications Associates, Inc. DCA Model 150 master network processors that interconnect a Honeywell, Inc. 66/90, an IBM 370/158 and a 155 and a pair of Microdata Corp. computers.

Duties for the Honeywell and IBM systems are divided as follows: The Honeywell provides general time-sharing services to back up rate studies and economics research, perform power-requirement calculations and support environmental planning. The IBM systems provide the text processing capabilities needed for sales, planning, budgeting, financial services and other departments within SCS.

These CPUs are connected via the network processors to asynchronous CRT and hard-copy terminals at the remote sites over microwave and leased lines.

Codex Corp. modems are used almost exclusively because the company can respond out of an Atlanta-based service center in two or three hours.

Two Birmingham, Ala., sites each use a DCA 150 remote processor for their 32 terminals, as does the 32-terminal remote site in Dotham, Ala., while 16-terminal sites in Pensacola, Fla., and Baxley, Ga., use the smaller System 115 remote processors for communications with the mainframes and smaller systems, acording to SCS Communications Engineer Bob Sowell.

Concern for Reliability

The work processed through the network is divided between word processing and engineering. Security is not as critical as reliability and data integrity. "We're not really concerned about anybody observing what is going on because it is strictly engineering work," Sowell explained.

But ensuring reliability and integrity is a high priority for SCS.

For example, the pair of DCA 150s, hardwired together and directed by a Digital Equipment Corp. PDP-8 microcomputer, can be backed up by a spare Model 15. The spare is also used for several other functions, including off-line changes in software.

If, for example, port speeds have to be changed, "we can make an on-line change in the 150 and 'save off' the change on a save disk. If or when we have to reload, we don't have to make that change again," Sowell indicated.

At the central and remote sites, each network processor is backed up by a spare set of circuit cards. For the Model 130s, which include six DCA cards, spares are kept on hand to replace defective boards. The 130s are controlled by a PDP-8 on a built-in board, which can be swapped for another board or repaired by DEC.

The smaller 115s have a complete kit of spare cards on-site, according to the communictions engineer.

SCS originally picked the DCA equipment to use with the Microdata computers. The systems are used for document storage and are located at the Dothan and Baxley sites, both nuclear generating facilities. "If we lost one of the Microdatas, the requirement was that we could share the other. We needed a multiplexer that could readily switch between the systems.

"When we found that the DCA systems had a host select

(Continued on Page 50)

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6 Major Topics 12 Industry Experts 20 Years of Data Processing

As Computerworld looks back at the 70's and ahead to the 80's in our Year End Wrap-Up Issue.

According to E. Drake Lundell, Jr., editor of **Computerworld,** this special decade-ending Wrap-Up Issue is "designed to be read thoroughly, not just glossed over and shelved." We'll do this by focusing on six major topics of current high interest to users, with selected industry experts covering each topic. One expert will look back a decade, and another will write on the future. Here are the details.

Technology — As the (by now) well known saying goes, "If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost $2.50 and get 2,000,000 miles per gallon." We won't go back 30 years, but one of our experts will look back at the 70's, while another will look ahead to the 80's and what we can expect in the way of technological changes and their impact on data processing.

Minicomputers — Did you know that Computer Control Corporation was the world's leading minicomputer company back in 1970? Do you know what happened to them? The minicomputer has come a long way in the last ten years. One of our industry experts will look at how far it has come, while another will examine its future.

Medium to Large Systems — We've gone from tubes to transistors to large scale integration to very large scale integration. And the changes have been dramatic. Our experts will look at both the past decade and the coming decade to show you just how dramatic those changes have been.

Software — Nothing in the computer industry has been the butt of more jokes than "software" and all the images that word conjures up. But as we've all come to know, "software makes hardware happen" — and it will be increasingly important in the next decade . . .We'll also look at its development through the past ten years.

DP Operations — In 1970, "distributed data processing" was unheard of. Large central systems were the order of the day. We still have large centers of course, but we have a lot of other things as well. As DP has become a more integral part of the organizations it serves, DP Operations have become much more complex. Experts will look at both the past and the future.

Communications — It wasn't very long ago that the key to computer communications was the person who carried the punch cards from one office to another. So there's a lot of change to review — and a lot more to come in the 80's. Two experts will look at this aspect of data processing.

PLUS . . . We'll have short articles from industry leaders, both old-timers and young up-and-comers . . . and we'll take a humorous look at some of the predictions the experts were making back in the 70's and how they came out. (We'll also look at some predictions that were missed, like the microcomputer explosion.)

This could be the most important issue of **Computerworld** this year. If you want to find out what has been so you can better guess what will be; don't miss our December 31st issue. And if you market products or services in the computer field, you'll want your ad there. Closing date is December 14th. Your **Computerworld** representative can give you complete assistance in ad planning. Or, to reserve space for your ad, call Frank Collins at (617) 965-5800.

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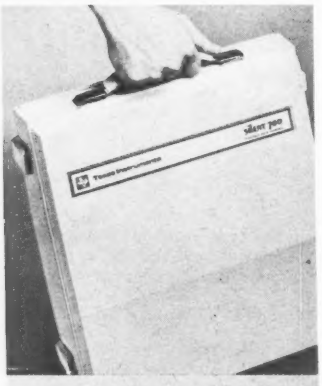

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Network Tightens Utilities' Data Control

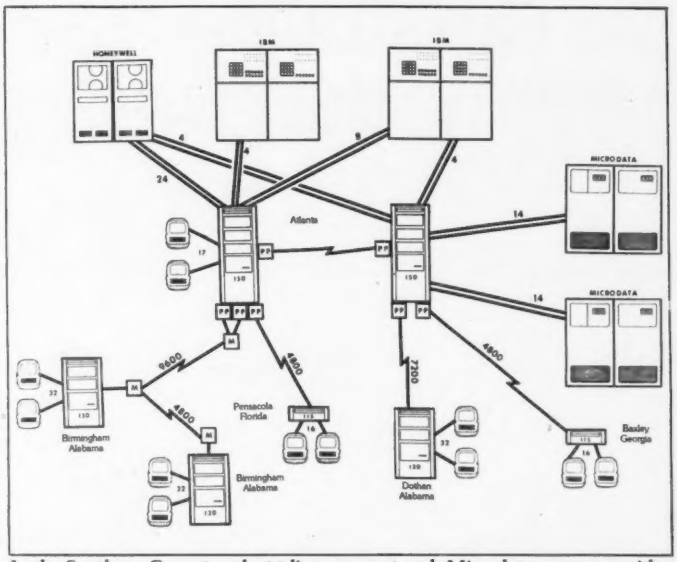
(Continued from Page 49)

capability, it was just what we wanted. We ended up using them for everything else too," Sowell said.

Calling the computer configuration at SCS a "shared system," Sowell said that "a job run on one system can be input to another system we have. One job may originate on the 370/155, for example, but may be processed on the 370/158.

From day to day, the word processing system can be brought up on a different mainframe, he added. "We really don't have the computers for redundancy, except that they are capable of running each others' functions. We needed an additional mainframe," he said, referring to the company's use of the second IBM system, "because one is not enough."

How is integrity of the data preserved? Another reason SCS chose the DCA multiplexers is their error detection/correction mechanism for asynchronous data. They use a cyclic redundancy check (CRC) character "tied onto the end of the block," Sowell said. It can test itself and repeat the transmission of the block until it is correct at the remote site.



In the Southern Co. network, 14 lines connect each Microdata processor with a DCA Model 150 that serves 32 terminals in Dothan, Ala. and 16 terminals in Baxley, Ga. That 150 has four lines to an IBM 370 and four lines to a Honeywell 66/90. A second Model 150 serves a total of 64 terminals in Birmingham and 16 terminals in Pensacola and communicates with the 66/90 and both 370s.

I/O Processor Functions Alone, in Net

NASHUA, N.H. — An Ascii eight-channel I/O processor is available from Functional Automation, Inc., for use as a stand-alone system or as part of a network in telecommunications, packet switching and data acquisition/logging.

The F6420 processor can handle eight channels at speeds up to 19.2K bit/sec. It includes a pair of on-board microprocessors that operate in parallel — one dedicated to I/O and the other with resident multiuser Basic for applications code, the vendor said.

Half the address space of each micro is paged into a 256-byte triplexed synchronous common memory, while the other half is used for I/O and for on-board private memory.

The F6420 was designed as an independent element of Functional Automation's microprocessor-based mainframe.

The F6420 Ascii 8 I/O processor costs $15,000, the firm said from 3 Graham Drive, Nashua, N.H. 03060.

Siemens CRTs Gain Editing

ISELIN, N.J. — Siemens Corp. T-1000 and PT-80 teleprinter users can now order a CRT unit with editing capabilities.

The CRT 1080 is available in 12- or 14-line display versions, has a 9-in. screen and includes a 20-key operator control panel and an interface to the teleprinters.

The accessory can be supplied with the T-1000 for five-level operation in a Telex and/or private-line environment or with the PT-80 terminal for an eight-level Ascii device compatible with direct distance dialing, teletypewriter exchange, Dataphone, general private communications and computer interconnection equipment, the vendor said.

The display can be supplied as an integral part of the T-1000 and PT-80 or can be field-installed on existing terminals and printers. Cost for the basic 1080 with 4K bytes of memory is $1,364, Siemens said from 186 Wood Ave. S. Iselin, N.J.

This terminal is fast, bilingual, and can chart a course.

The AJ 860. Quite probably the most highly featured desktop teleprinter terminal you can buy. And now you can buy a lot more including 1200 baud, APL, and graphics.

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This is all in addition to the long list of standard features that have made the AJ 860 so popular: 128-character ASCII code set, dual gate forms tractor, easy-to-use sculptured keyboard, 17-key numeric pad, complete forms control, RS 232 line interface, mobility, and more.

Call your nearest AJ regional office: San Jose (408) 946-2900; Chicago (312) 671-7155; Hackensack (201) 488-2525. Or write Anderson Jacobson, Inc., 521 Charcot Avenue, San Jose, California 95131.

Also available through AJ subsidiaries in Ottawa, Ontario; Paris, France; Shepperton, Middlesex, U.K.; and distributors throughout Europe.

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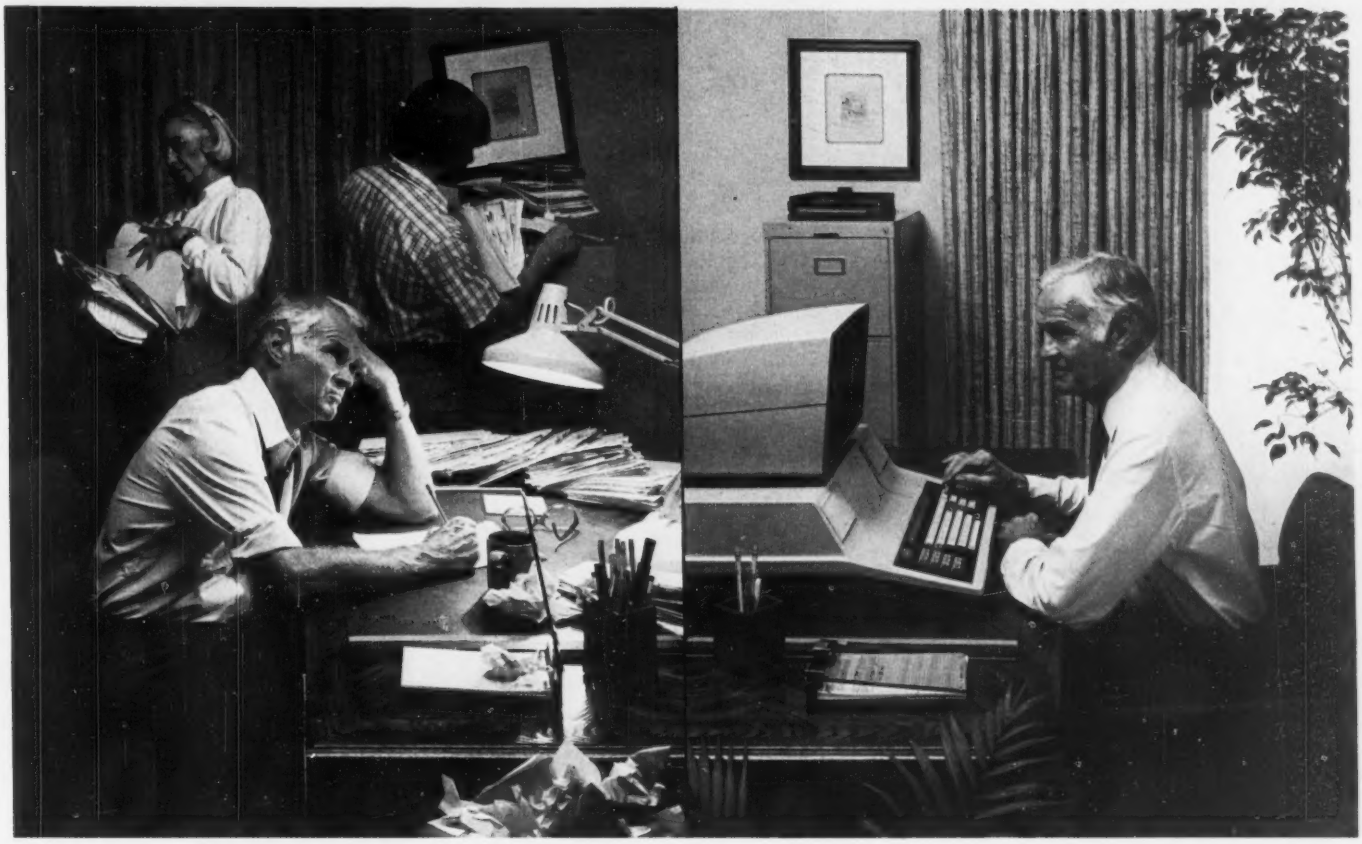

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The Model 771 desktop computer uses single-sided, single-density diskette storage for a total of up to 500,000 characters of instantly available on-line data storage. The DS990 Model 1 stores up to 4,600,000 characters using double-sided, double-density diskette storage, making it among the most powerful small business computers available anywhere.

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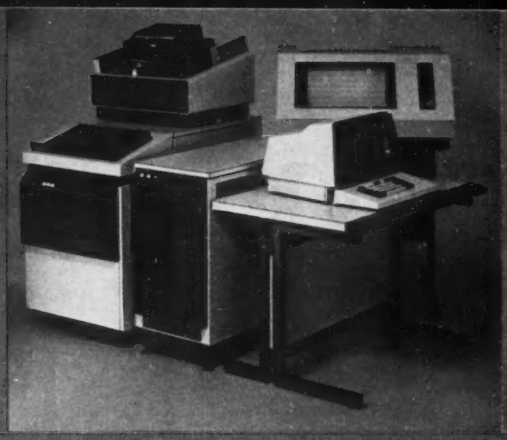

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Peopleware: *Hardware, software or systems designed for maximum effectiveness by emulating the best of human form and/or functions.*

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It's the use of that simple tool, the human hand, in simplifying complex tasks that has helped man to build civilization itself.

The increasing complexity of the world of business today demands that same simplicity of performance. This has been the philosophy behind Pertec Computer Corporation's development of our XL20 and XL40 DDP systems: combining sophistication with the ultimate in simplicity.

Ease of Application Development. Fully developed capabilities of data entry, file management (COBOL Shared Access Method-COSAM) and communications are already within the operating system. So you save time by not having to write these utilities. The user can implement a tailored application quickly and easily by filling in simple parameters. Further processing power and flexibility are provided with COBOL procedures.

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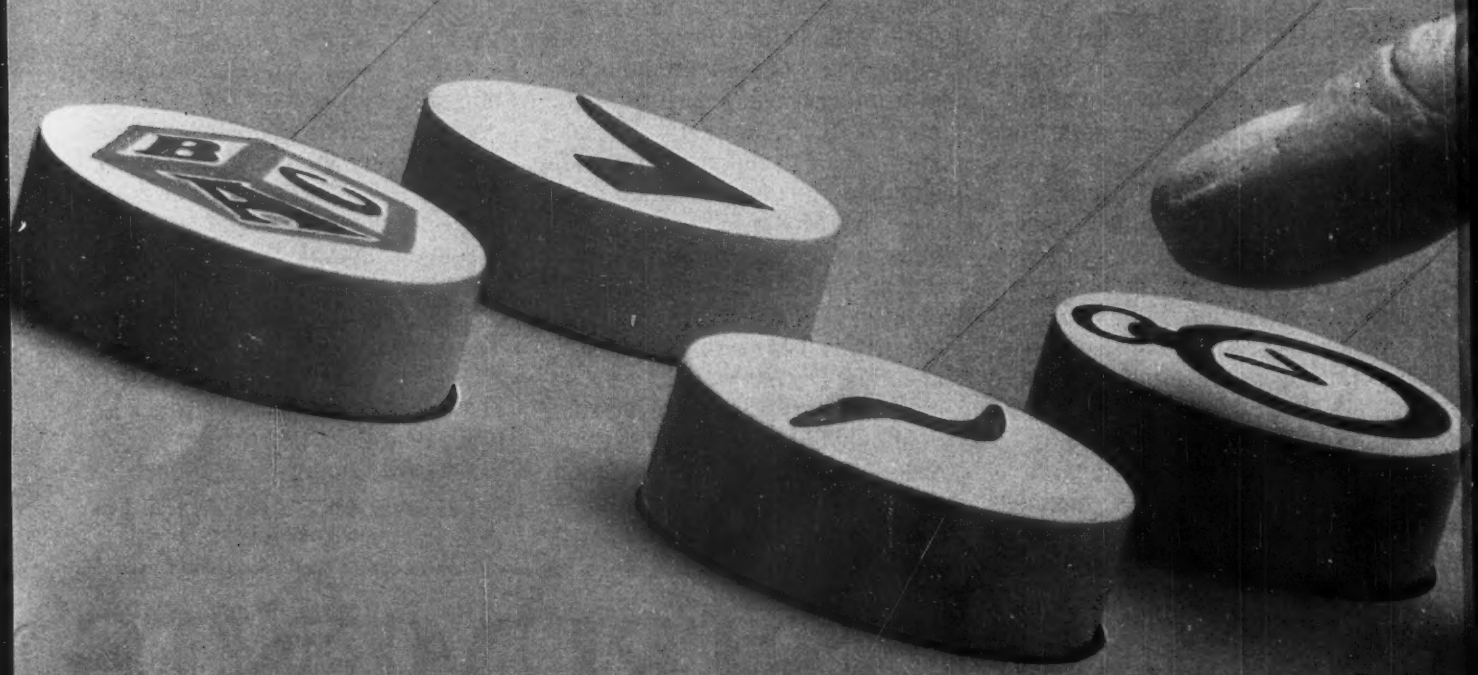

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Simplicity is just one example of how we have used the PCC Peopleware concept in our XL20 and XL40 systems. It's just one more way we make our DDP systems more effective. And your DDP buying decision simpler.

The XL20 and XL40 are products of Pertec Computer Corporation, an international company that designs, manufactures and services computers and computer equipment.

For more information, write Pertec Computer Corporation, 12910 Culver Boulevard, Los Angeles, California 90066. Or call toll-free at 800-331-1001 in the continental U.S. (In Oklahoma, call collect 918-664-8300.)

Voice Response Pay-by-Phone Comes Into Own

(Continued from Page 47)

was dubbed the "Direct Line." In June 1978, interested customers began using Direct Line.

The system consists of the Wavetek ADC1500 voice response system and a Digital Equipment Corp. PDP-11/34 minicomputer. The ADC1500 is a general-purpose controller for computer/communications systems.

As the link between the PDP-11/34 and the customer's Touch-Tone telephone, the Wavetek unit provides computer voice response to input from the Touch-Tone phones, which act as remote terminals. The ADC1500 holds 480 words of data; Union Commerce has 120 words in its Direct Line application.

The Wavetek and DEC units were recommended and installed by Seattle-based Telephone Computing Services, a pioneer of the pay-by-phone concept since 1972. Telephone Computing Services supplied complete application software and had us up and running with our customers three weeks after all equipment was delivered.

The quality and reliability of the Wavetek voice-response system has helped us maintain and enhance our technology leadership position in our market area.

In addition to the Wavetek unit, which handles Touch-Tone calls 22.5 hours a day, seven days per week, Union Commerce has six tellers receiving pay-by-phone calls. A tape recorder is set up to accept calls after business hours from customers who lack Touch-Tone phones.

'If a customer attempts to overdraw his checking account, the [voice response unit] will interrupt with a message to stay on the line and wait for assistance from a bank teller. This capability eliminates overdraft problems.'

The use of Wavetek audio response in telephone bill payment is by far the most efficient method of handling the service. However, we make it clear to our customers that the choice between teller and audio response pay-by-phone is theirs. Fifteen percent of our pay-by-phone customers have elected to use Direct Line.

The customer who calls the Direct Line number is greeted by Wavetek's computerized voice and guided through the following steps:

- Enter account number and "#" sign.
- Enter security code and "#" sign.
- Enter payee code and "#" sign. (A number is previously assigned to each merchant the customer wishes to pay.)
- Enter the desired amount to be paid and the "#" sign. (The "*" is used as a decimal point.)

The Wavetek unit repeats steps three and four until the customer enters "02#" to end his transactions for that day. At every step in the process, the voice response system repeats to the customer what he has just entered, reassuring him that the machine is handling his transactions correctly.

For example, if the customer punches a phone payment of $36.14, the Wavetek unit acknowledges the payment made with the words "thirty-six dollars and fourteen cents."

If the customer wants an entry repeated, he pushes "#" and the Wavetek unit will repeat it. If he makes a mistake, he can easily erase the last entry by pushing "*#".

If the user loses his place or runs into any other problems, he can punch "0#" and the Wavetek unit will transfer the call directly to one of the pay-by-phone tellers. The teller can immediately obtain a display of the customer's transactions to that point in time and personally conclude the processing. However, this rarely occurs because the procedure is so simple.

If a customer attempts to overdraw his checking account, the Wavetek voice will interrupt with a message to stay on the line and wait for assistance from a bank teller. This capability eliminates overdraft problems.

Currently, customers cannot use Direct Line to check their direct deposit account (DDA) balance. Pay-by-phone tellers will do this on request by accessing the PDP-11/34 or a second voice response unit at Union Commerce.

The latter unit is not a Wavetek model, but we are so favorably impressed with the Wavetek Direct Line application that we may apply the vendor's voice-response system to balance verification as well.

Daily Shutdown

Every day, we shut down the system at 5 p.m. for 10 to 15 minutes so the PDP-11/34 can complete its reception of all teller and Direct Line-activated pay-by-phone transactions.

'Once a month, a descriptive DDA statement is issued to the customer, detailing all payments, payees and dates of payment. Our pay-by-phone system literally does everything but stuff envelopes.'

The computer provides reports on every customer who had a transaction that day. Transactions to the same merchant are combined, and one check with an itemized remittance report is prepared for each merchant.

Once a month, a descriptive DDA statement is issued to the customer, detailing all payments, payees and dates of payment. Our pay-by-phone system literally does everything but stuff envelopes.

Customer reaction to pay-by-phone has exceeded the high goals we set. Union Commerce assumed that after the first year of offering pay-by-phone, 10% to 12% of our DDA customers would be signed up for the service.

At present, 20% of our customers employ pay-by-phone, making payments to several thousand merchants. Of that 20%, almost half are new customers.

Moreover, we have cross-sold savings accounts to 65% of our pay-by-phone customers because it is so easy to transfer bill-paying dollars from savings to checking accounts.

At Union Commerce, the pay-by-phone service and Direct Line in particular is substantially reducing the amount of paper we process. For pay-by-phone customers, check processing has decreased 80%. For every 10,000 transactions we process, we issue only 2,000 checks.

Audio response is the most cost-effective way to implement pay-by-phone. Metropolitan Cleveland has a Touch-Tone penetration of 40%, including businesses and residences. As Ohio Bell continues to market features such as call forwarding that can only be used with a Touch-Tone network, the potential Direct Line market will increase.

Direct Line users will most likely represent a larger percentage of our pay-by-phone customers as consumers gradually begin to feel more comfortable about automation.

Ayres is the product manager officer of Union Commerce Bank in Cleveland.

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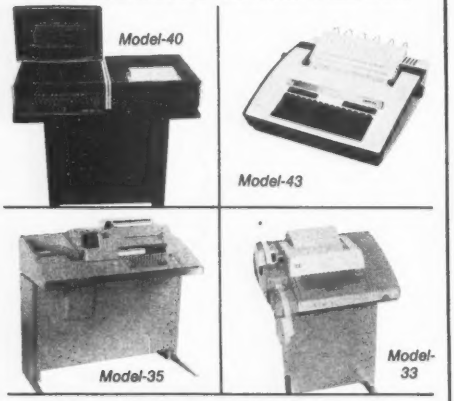

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Using Infrared Wavelengths

IBM Scientists Transmit Data Without Wires

ZURICH, Switzerland — IBM scientists here have demonstrated a novel way of transmitting computer data without wires in an enclosed environment — by broadcasting on infrared wavelengths.

The experimental work may prove useful for the increasing number of computer systems that employ small, local terminals to perform individualized tasks, such as sorting checks, controlling the movment of inventory and supervising the activities of industrial robots.

Wireless data transmission may be especially suitable in large office rooms and factory floor or warehouse environments, a spokesman said.

Radio waves also could be used for wireless data transmission, but infrared waves — which occupy a different part of the electromagnetic spectrum — are not susceptible to electronic interference, and are more easily confined to transmission within a desired area of reception.

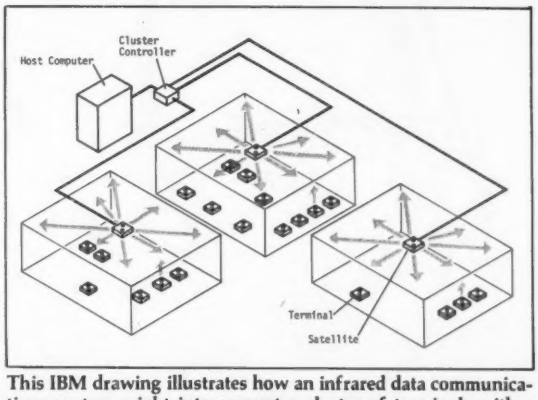
The experiments were conducted at IBM's Zurich Research Laboratory with a 64K bit/sec infrared transmitter and receiver using carrier modulation (as is done in radio broadcasting).

The IBM scientists envision an infrared data communications system this way: each terminal on the floor of the working area would be equipped with light-emitting diodes (LED) for sending the infrared signal, and photodiodes for receiving. LEDs are cheap, small devices (used in digital display watches, for example) that, with proper filters, can be made to emit most of their light in the infrared spectrum. The wavelengths are in what is known technically as the "near infrared," close to the range of visible light.

Wavelengths in the rest of the infrared region are sensed as heat and would not be suitable for communications, the spokesman explained.

A central infrared station, installed in the ceiling of the room, would be the main control point for all the terminals. The station would poll each terminal in turn, asking, in effect, "Do you have any new data for me?" The terminal would reply on a different frequency.

Terminals today are usually connected by copper coaxial cables to the host computer or to a central controller that communicates with the CPU over phone lines if the CPU is somewhere else. As Hans Mueller, manager of IBM's Infrared Research Group in Zurich put it, "This means that every time you want to install a new terminal, you have to run a new cable . . . Even if you just want to move around the terminals you've got, the wiring has to be redone."



This IBM drawing illustrates how an infrared data communications system might interconnect a cluster of terminals with a common cluster controller. Each terminal is equipped with an LED and a photodiode for converting an electronic signal to one in infrared light and vice versa, respectively. Within each room, a central satellite station mounted above the working area receives and transmits infrared signals between itself and the terminals.

The cost of stringing wire is expensive and is not expected to go down because of the labor involved in putting the wire into place.

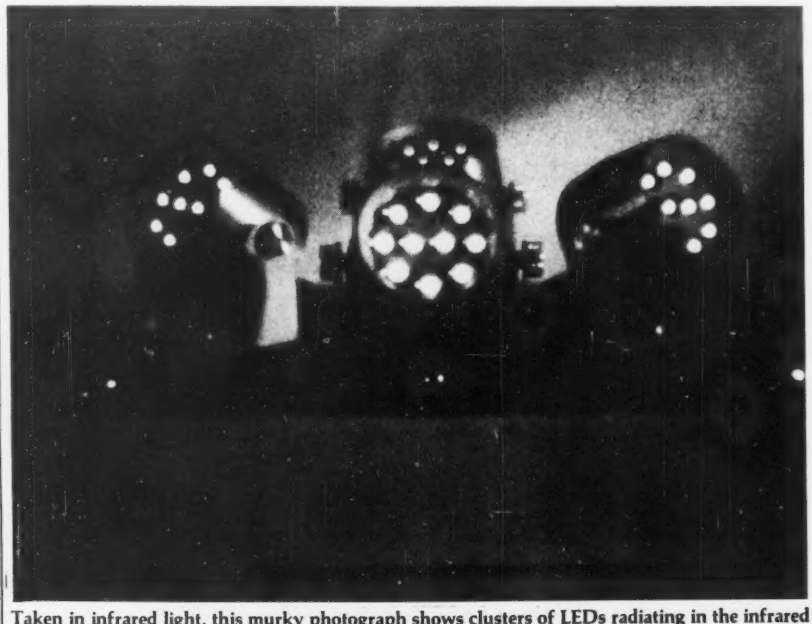
Meanwhile, the tasks and relationships of terminals vis-a-vis the computer are evolving. Microprocessors provide many terminals today with a self-contained ability to process and to store data.

Terminals also are being tailored to perform specific applications. The result is that terminals do not need to remain in continuous contact with the host computer; they just need to "report in" occasionally, with relatively small loads of data, Mueller observed.

"That's why we went looking for ways for terminals to communicate without wires, ways that would be compatible with the low-cost consumer prices that computer equipment of the future will have," he said. "And we think infrared shows promise."

According to Dr. F.R. Gfeller, one of the IBM scientists at Zurich working on the infrared project, "there is a need to place terminals flexibly at different positions within the same room to suit the particular working conditions, to reconfigure existing terminal arrangements, or even to have mobile hand-held terminals."

"Progress in low power consumption microprocessors, liquid crystal displays, and miniature keyboards has brought a battery-driven personal terminal within the state of the art," Gfeller continued. "Conceivable applications are message transmission, paging, voice transmission, remote control, stock taking or classroom teaching."



Taken in infrared light, this murky photograph shows clusters of LEDs radiating in the infrared portion of the spectrum. IBM envisions an infrared data communications system that would transmit via LEDs and receive via photodiodes.

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SOFTWARE PORTABILITY!

By Sal Razza

Achieving software portability — or at least partial portability — is one of the major challenges facing the computer industry today. It is also an important economic factor in its growth. Why?

Because as the costs of hardware and hardware performance continue to decrease, software costs continue to climb. By one estimate, the lack of software portability, that is, hardware independence, costs the federal government $200 million annually.

Software portability *is* possible, and this article explores four approaches to solving the portability problem: the *language standardization* approach; the *intermediate language* approach; the *portable system* approach; and the *plug-compatible mainframe* approach.

Within the industry, the term "software portability" is used interchangeably with "hardware independence." Software portability can be defined as the ability to transport software that runs on one computer to another computer with little or no conversion.

The goal is simply stated, yet it has eluded the computer industry for a long time. Only in the last few years has this objective begun to be realized.

The following are probably the major causes of the failure to achieve system portability: (a) the industry's competitive spirit, resulting in different hardware and software architectures; (b) the lack of standards enforcement; and (c) the lack of truly machine-independent, high-level language specifications.

This article summarizes the findings of a software portability study done by Monchik-Weber Corp., New York, N.Y.

From the beginning, hardware manufacturers have competed to achieve the best price/performance for their respective machines. This competition has led to a variety of hardware and software architectures. Since the hardware manufacturers were generally responsible for the development of the related software, they tried to optimize the use of their hardware through interrelated software design. Thus, software became highly machine dependent.

Even with the advent of high-level languages, there was no profit incentive for a computer manufacturer to produce software that could be run on a competitor's machine. As a matter of fact, there was an inherent contradiction between computer sales efforts and software portability, except within the manufacturer's own line of computers. This situation hasn't changed significantly in recent years.

Lack of Standards

As for the lack of standards, business in general did not insist on the development of a computer system that would meet standards for portability. Rather, users required that performance at the best price be the primary objective. Presently, the cost of hardware is continuously diminishing while the cost of conversions and the manpower involved is continuously increasing. Business and government are acutely aware of this fact and are now truly concerned with software portability in order to protect their software investment.

A truly machine-independent, high-level language is not yet a reality. However, the Department of Defense (DOD) is looking into the development of a hardware-independent, common programming language (called Ada) for DOD procurements. In addition, the Pascal language, which was specifically created to be machine independent, has been catching on quickly for micros, minis and mainframes. Even though there is no guarantee that these languages will achieve the goal of software portability, portability is the inherent language design objective of both Pascal and Ada. (We also realize that this was one of the objectives of Cobol. We hope we have learned from our mistakes both in the definition and implementation of that language.)

Cobol was one of the first attempts at a standard language. It made a very good attempt at standardizing terminology and at separating machine dependencies (for example, creating separate environment and data divisions) from the executable code (the procedure division). However, because of ambiguities, it fell prey to various manufacturers as they implemented their versions of the language.

In addition, a permissive policy of allowing language extensions developed, and Cobol extensions and variations became widespread. Incompatible data representations also became inherent characteristics of the different vendors' implementations, and this made one vendor's Cobol programs superior to and/or also different from another's.

In summary, then, the lack of a truly machine-independent language specification, combined with the competitive nature of hardware manufacturers and the lack of standards enforcement, contributed to the incompatibility of Cobol.

Degrees of Portability

To appreciate the nature of this problem, let us assume that a software system consists of four software components and that the degree of software portability is different for each component. The four software components are the application programs, the operating system, the communications system and the file/data base management system. Of the four, the application programs can be most portable. The operating system, if designed and developed with portability as a foremost objective, can be portable over a range of similar, but nevertheless different hardware.

The communications system and the file/data base management system are less likely to be portable. They will usually contain inherent and embedded dependencies on the particular hardware used and on the particular operating system used. However, the extent of the portability of these two software components is increased if the operating system software component is also portable. This is true since their interface dependency on different operating systems is eliminated when the same operating system can be used on different hardware. The hardware dependencies can then be approached as part of the problem of transferring the operating system and not the communications of file/data base management system per se.

The type of product developed to achieve software portability will depend on the hardware-independent design approach used. Although all four approaches to be discussed here are technically feasible, the plug-compatible mainframe aproach is considered too restrictive since it concentrates mainly on IBM replacements.

All of the approaches are technically valid and are currently in various stages of either implementation or testing by government and industry groups. Except for the last approach (plug-compatible), they all require a high-level language and the enforcement of defined standards. A summary of their different implementation methodologies follows.

Language standardization approach.

(Continued on In Depth/2)

IN DEPTH

(Continued from In Depth/1)

This approach achieves a high level of hardware independence by conforming to a set of standards or guidelines for application software development. In particular, these standards apply to the high-level language in which the application programs are written. A cross section of "similar" hardware must be identified on which the high-level language has been implemented and which conforms to a defined set of requirements (such as 16-bit word size, Ascii character set and so forth for minis and micros, and corresponding requirements for larger systems.)

Hardware independence of application programs is realizable if the programmers adhere to a strict language standard and the compilers and preprocessors enforce it. The compilers for each target destination machine would accept virtually the same source statements and would compile object code that produces the same results as the original or source machine. The preprocessors would enforce the standards and conditionally translate the original source statements into source statements for the target machine. Modifications to the various target machine compilers may be required to achieve a high level of application program portability.

Both data base standards and communications standards would be implemented in this approach to achieve software component portability. Portability of the operating system, however, is not considered in this approach.

The high-level language used should conform to government standards (where they exist) and provide a sufficient level of hardware independence to enable a high degree of portability between different computers. Currently, the government-approved standard is Cobol, with Fortran and Basic under investigation by the National Bureau of Standards. Therefore, Cobol would be the first-choice for the language standardization approach.

If Cobol is chosen, the latest released Cobol standard, Ansi X3.23-1974 Cobol (published by the American National Standards Institute, New York), must be adhered to for this approach to be successful. (A revised version of this standard is currently being prepared.) The degree of adherence must be determined as there are multiple defined levels, as well as multiple features, for standard Cobol.

A set of basic and desirable requirements for the software and hardware processing environment must also be defined. Then, the following procedures should be followed to achieve hardware independence.

First, a subset of a standard Cobol (which may be the highest level of implementation for this language) must be defined as the standard.

Second, the target machines must be chosen, and they must have Cobol compilers equal to or surpassing the standard Cobol subset.

Next, all extensions, idiosyncrasies or variations from the standard of the particular vendor's Cobol must be eliminated or the use of these differences must be qualified and restricted. (A great deal of this analysis has already been done by the federal government's Cobol Compiler Testing Service group. The group's validation of vendor Cobol by comparison with Ansi X3.23-1974 and other findings have been documented in reports available through the National Techni-

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cal Information Society (NTIS).

After comparisons with the standard Cobol subset have been performed, it may be helpful to review the discrepancies between the various manufacturers' Cobol implementations and the standard in order to derive a more encompassing subset or to highlight potential problem areas.

After a compatible Cobol standard is agreed to, a simple preprocessor program may be defined. The primary objective of the preprocessor is to enforce the use of the compatible Cobol standard by the programmers. Secondary objectives of the preprocessor may be to serve as the translator of one Cobol dialect into another; as a verifier ensuring that good programming practices are being followed; and as a means of permitting programmer flexibility.

Test programs will also be needed to check the compatibility of the various target machines. Data conversion aids provided by manufacturers and/or software houses or developed elsewhere will assist in data conversion for the target machines.

Questionable Efficiency

Although the definition and enforcement of a compatible Cobol standard may achieve software portability, the efficiency of resulting code may be questionable. Efficiency will depend on the number and type of Cobol restrictions and the individual compiler implementations of the compatible Cobol standard.

The language standardization approach is particularly applicable to minicomputers since minis often have similar hardware architecture. It will apply less to large systems because of incompatible word sizes, different data representations and various compiler constraints imposed by the operating system requirements.

A language standardization approach featuring Cobol would benefit the vast majority of government programmers (it is estimated that 90% of their programs are written in Cobol, and therefore retraining of this group would be minimal). Although other languages such as Pascal or Ada could be used for this approach, more retraining would be required. However, this could be worthwhile in the long run for both the government and industry.

Presently, the language standardization approach appears to involve the least risk and the least development effort of the four approaches. However, there are some interdependencies and uncertainties.

For example, this approach is highly dependent on defining correct and essential programming guidelines and standards for a high-level language. This approach is also dependent on the ability to enforce those guidelines and on the availability and applicability of the required data conversion tools, which may affect the degree of compatibility desired.

Major Uncertainties

Among the various uncertainties, two major ones should be considered:

- Can the goal of establishing a compatible and operable subset of a high-level language be easily accommodated across a large cross section of the hardware environment? And will it require either major modifications to the individual target machine compilers or the elimination of a considerable amount of hardware because of noncompliance with the standard?
- Does the restriction of using the compatible language subset reduce the efficiency of certain hardware/-software environments to an unacceptable level?

Intermediate language approach. This approach involves the development of a standard language that can be compiled to an intermediate language and then transferred to and executed on different target machines via the target machine's interpreter/-

(Continued on In Depth/4)

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IN DEPTH

(Continued from In Depth/3)

assembler or through microprogramming. The interpreter/assembler is written in the native language of each target machine.

This approach permits a high degree of portability of application programs. The portability of the associated communications and file/data base management systems remains questionable.

Like the language standardization approach, this approach (in this context) does not provide for portability of the operating system.

The intermediate language approach relies on the intermediate code generated to establish portability of the application programs. The execution of the intermediate code is performed by the interpreter, which is written individually for each target machine.

The intermediate code generated is standardized for a pseudo-machine (P-machine). Each real target machine simulates the "standard" pseudo-machine by compiling the application program sources to the intermediate language (P-code), which is then "executed" on the target machine.

The basic difference between this approach and the language standardization approach, other than the language chosen, is that the target machine compiler(s) must generate compatible intermediate code as opposed to generating native machine code for a particular target machine. This approach also differs from the third approach, the portable systems approach, in that the intermediate code generated must be able to relate to different operating systems' interface requirements.

Relative to the four basic software components, the intermediate language approach will provide a high degree of portability only for the application programs. As noted previously, the portability of the operating system is not considered in this approach. The communications system and the file/-data base management system software components depend on the specific hardware and operating system software architecture of the various target machines. Therefore, this approach provides questionable portability for these last two software components.

A major risk of the intermediate language approach is the necessity of generating code for each target machine that will provide the proper interface with the various operating system requirements and hardware architectures. There is also a high degree of dependency on operating system and hardware modifications that may affect this interface. As the number of target machines goes up and the number of operating systems increases proportionately, this problem may become more acute.

Time-consuming maintenance will be required to monitor and provide for unexpected as well as expected operating system software or hardware changes. Modifications to each of the compatible compilers created must then be made to incorporate these changes as well as the usual compiler enhancements. Compiler and interpreter maintenance will become a very critical factor.

Portable system approach. The approach permits the application programs as well as the operating system

(Continued on In Depth/6)

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And because CIS COBOL conforms fully to the standard, programs written with it are portable – so if you move up to a mini or mainframe, you will be able to take your software with you.

Equally, CIS COBOL can enable mainframe COBOL programs and programming tasks to be offloaded to less expensive microcomputers. Mainframe programmers love the ease of use of CIS COBOL and they achieve results fast running it on a desk-top micro.

Forms

The FORMS utility lets you build a screen layout online at the CRT. Then it automatically generates complete COBOL record descriptions for inclusion in your program – saving you time and leaving you free to concentrate on processing.

Forms-2

The FORMS-2 program generator – an extension of FORMS – completely eliminates the need to write simple data entry and enquiry programs. Using it, an entire CIS COBOL source program can be generated automatically from screen definitions – and it works, first time.

Environment

CIS COBOL products run on the 8080 or Z80 microprocessors under the CP/M* operating system, and on the LSI-11 or PDP-11 processors under RT-11. They are distributed in a variety of disk formats, and have a CONFIG utility supplied as standard, enabling you to drive many different types of CRT. All are themselves written in CIS COBOL, and are therefore self-compiling and readily transferable to different operating environments – including new operating systems and new microprocessors. All of which makes CIS COBOL a very attractive proposition for OEMs as well as end-users.

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IN DEPTH

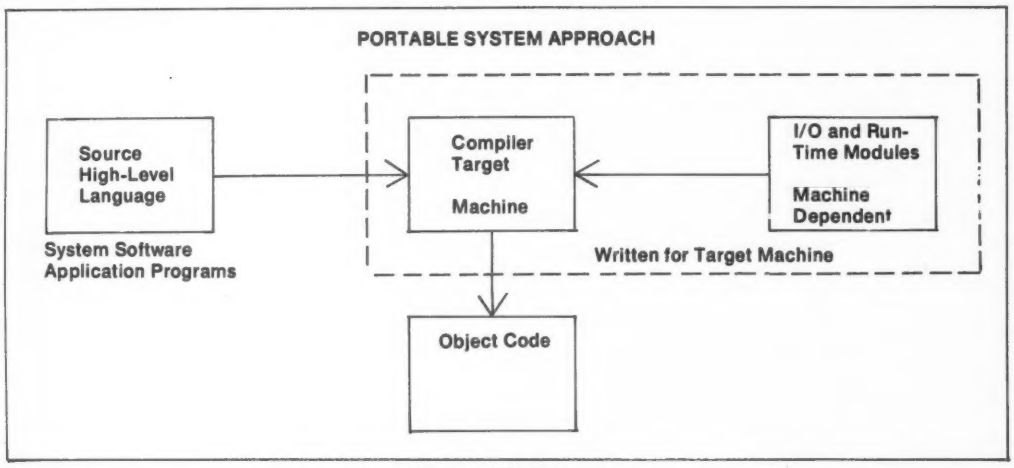

Figure 1. Thoth Design

(Continued from In Depth/4)

to be portable. This approach also lends itself to the portability of the other two software components: the communications system and the file/-data base management system.

This approach is a combination and expansion of the first two approaches. It defines a machine-independent, high-level programming language that can be used not only to write application programs, but compilers and operating systems as well. It uses one language to write all software components. In addition, this approach uses a somewhat portable compiler to then implement the software components on the different target machines.

The hardware dependencies are resolved for each target machine by rewriting the specific machine-dependent I/O and run time modules. These modules are identifiable; and can be isolated over a wide range of computers from microcomputers to mainframes.

Therefore, the portable system approach can be defined as the ability to transfer the *entire* software system (the operating system and the application programs) to another computer system. This approach necessitates the definition of standards for both a high-level, machine-independent language and a machine-independent operating system based on that language.

The underlying concept is this: Since the operating system and the application programs are written in the same high-level language, their interface requirements remain constant and their degree of compatibility and portability is very high. (Note that the specific machine-dependent modules are written in the target machine's native language.)

A major premise of the portable system approach is that a machine-independent, high-level language can be specified and developed to provide a high-level of hardware independence. However, true system portability depends on all the software (including the operating system and the application programs) being written in this language. The other major premise of this approach is that it is generally more difficult to interface with different operating systems' software than it is to interface with new or different hardware architectures.

An inherent characteristic of the portable system approach is that the individual target machine compilers ensure the software portability of the application programs to a high degree and of the operating system to at least a workable and acceptable degree. The application programs, then, become highly portable after the target machine's compiler is written and after the operating system is tranferred. In conjunction with developing portability of the operating system it is necessary to analyze and to rewrite the various target machines' machine-dependent functions. These functions include features such as interrupt handling, device driving and memory management and mapping.

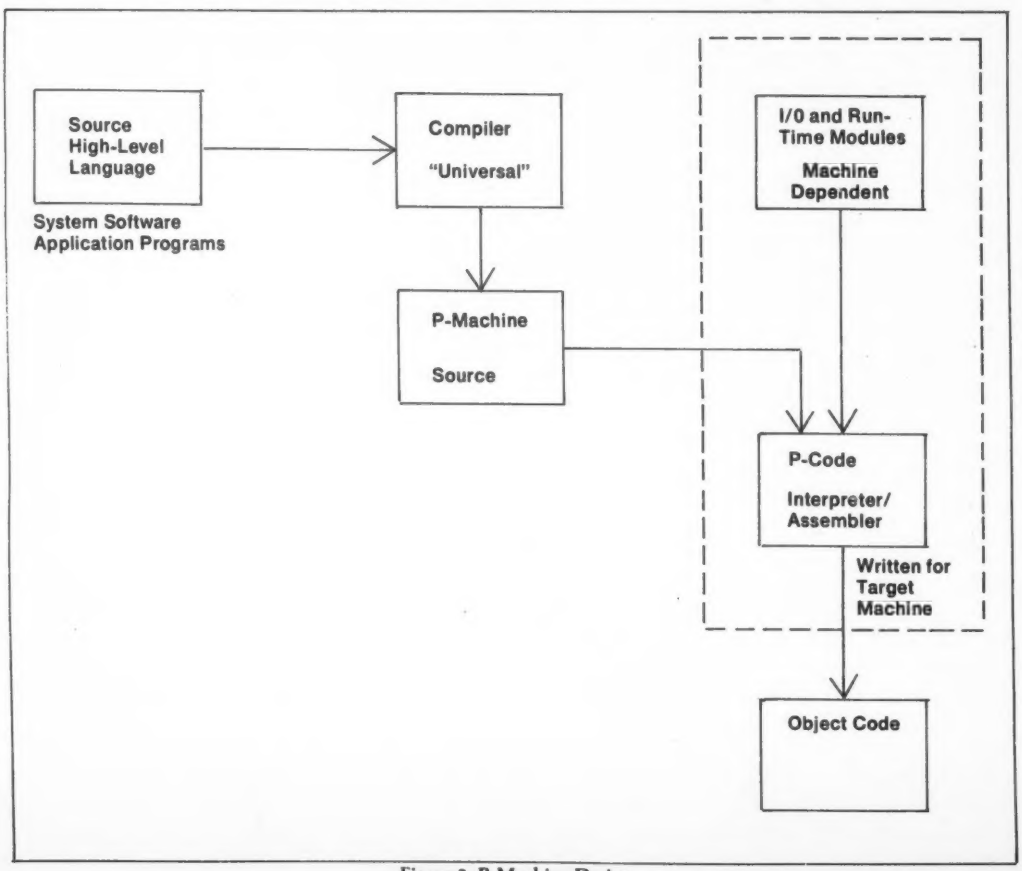

Figure 2. P-Machine Design

Two Designs

Two designs currently are being used to achieve the portable system approach. These designs embody the methodologies of the previously described approaches — the language standardization approach and the intermediate language approach. Both designs offer total systems portability and are currently in various stages of testing and implementation.

The first design may be referred to as the Thoth design, a real-time operating system designed to be portable over a large set of machines. This approach was used to investigate and to demonstrate the feasibility of portable operating systems for a specified class of machines. The work was performed by the Department of Computer Science at the University of Waterloo, in Waterloo, Ontario, Canada.

The design compiles the source code directly into the native code of the target machine and thereby provides a normal level of machine efficiency. This design is analogous to the standardization approach except that all source software is written in the same language.

The second design, the P-machine design, compiles the source code to an intermediate P-code, which is then interpreted by a program which is usually written in the assembly language of the target/host machine. This design is analogous to the intermediate language approach. The geneated P-code interpreter is portable to other computers which support a P-code interpreter (referred to as "P-machines"). The interpreter may be implemented in software or in micro-

code.

Figures 1 and 2, showing the two portable system designs, will serve to conceptually define their methodologies. Both designs follow the concept that all source software, including application and systems level, is portable.

Designed to be a real-time operating system, Thoth was written in a special high-level language derived from B, a programming language developed by Bell Laboratories. Thoth was successfully used on a number of minicomputers. These included the Data General Corp. Nova, the Texas Instruments Inc., 990, the Honeywell, Inc., Level 6, the Modular Computer Systems, Inc. Modcomp IV and the DG Micro-Nova. Facilities exist in Thoth to handle machine-independent utilities, communications and applications programs, although there has been no major effort to develop these facilities. This design approach is also considered viable for many minis, feasible for large systems and possible for 16-bit micros; however, it has not as yet tried large systems or micros.

Thoth-compatible machines must meet certain requirements in order to function in a Thoth environment. Other machines may be usable but would require additional changes because of their specific machine dependencies. Some of the Thoth requirements are a minimum of a 16-bit word, word addressability, a single processor, interrupt handling control and stack-oriented capability.

Two similar tests of operating system portability were performed independently of the Thoth project and of each other by the University of Wollongong Australia, and by the Bell Laboratories. In both test cases, the Unix time-sharing operating system in the high-level C language was moved from a Digital Equipment Corp. PDP-11/45 to an Interdata, Inc. 7/32 and an 8/32. Plans are currently under way to port Unix to a Univac mainframe as well.

Pascal System

The P-machine design has been incorporated into a system developed at the University of California at San Diego (UCSD) known as the Pascal Software System. This system is based on the P-machine concept developed by Dr. Niklaus Wirth, a professor at the Institut fur Informatik in Zurich. The Pascal Software System was developed at UCSD primarily by Prof. Ken Bowles, the university's director of the Institure for Information Systems, using UCSD's version of the Pascal language.

Pascal is a high-level language that was specifically developed in the early 70s as a machine-independent language. The two primary objectives in the development of Pascal were to create a language that would: 1) serve as a tool for teaching systematic programming and could be reasonably and efficiently implemented on most computers; and 2) be independent of any particular machine in order to facilitate the interchange of programs.

The UCSD Pascal Software System has been transported to many microcomputers including the Z80 family of microprocessors and the DEC LSI-11, as well as the General Automation, Inc. 110, 220 and 440 minicomputers. There are plans to transport the systems to other micros and minis as funding becomes available to UCSD.

The Pascal language or versions of the language have been implemented on many different computers ranging from the LSI-11 microprocessor to the Cray Research, Inc. Cray-1 Los Alamos Scientific Laboratory supercomputer. Implementation of the Pascal language have been written in Pascal itself, native assembly language and other high-level language compilers such as Algol and Fortran. Some versions compile to P-code that is then executed by an interpreter. Other versions compile to P-code that is then

(Continued on In Depth/10)

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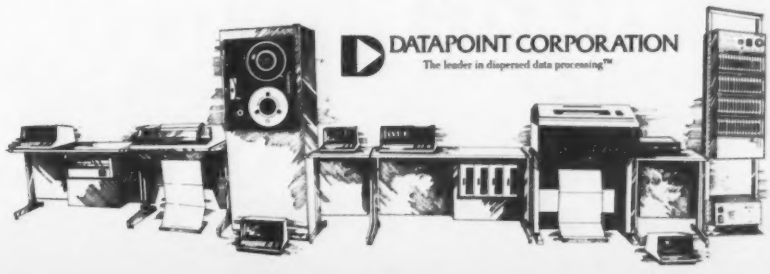

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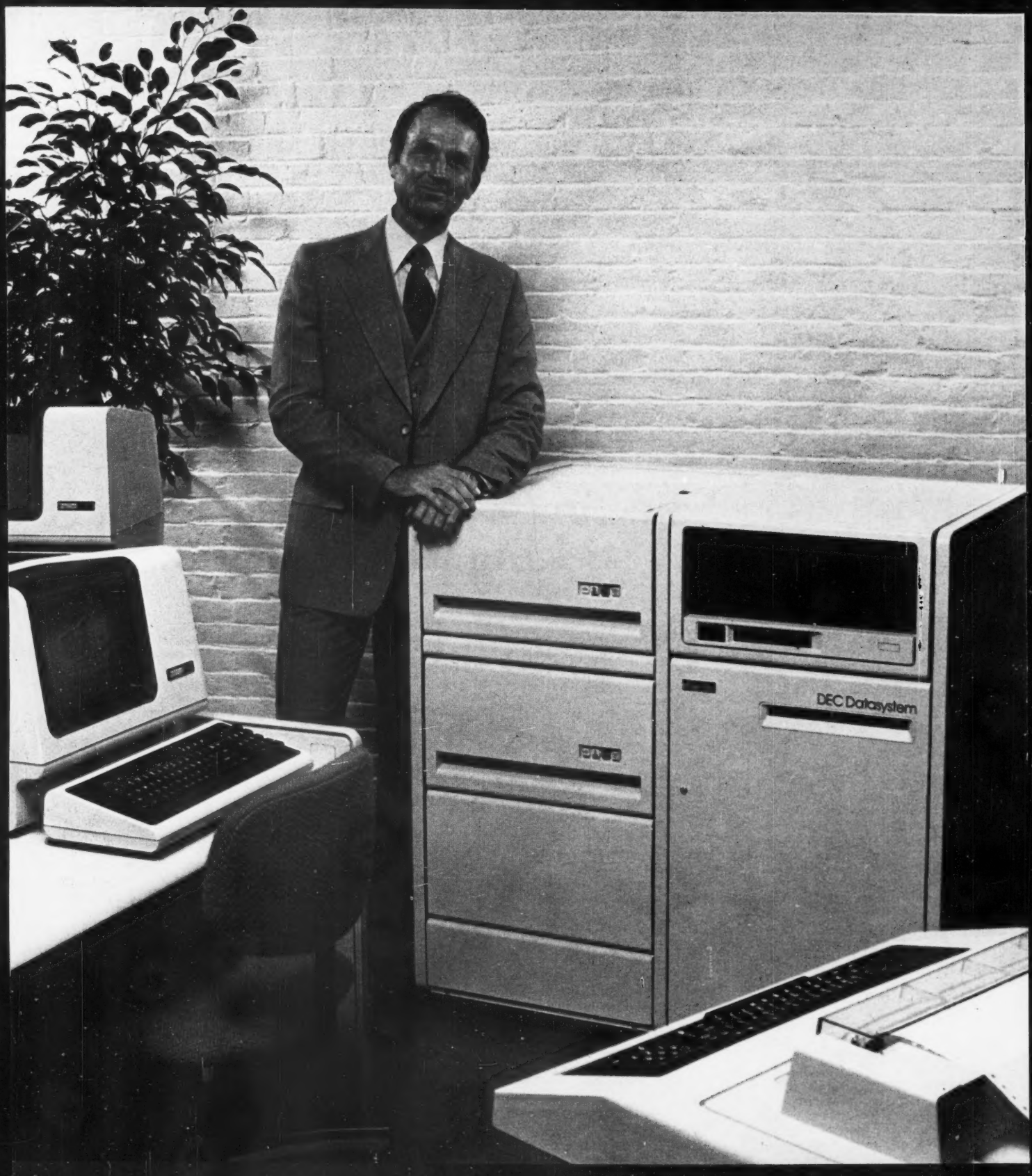

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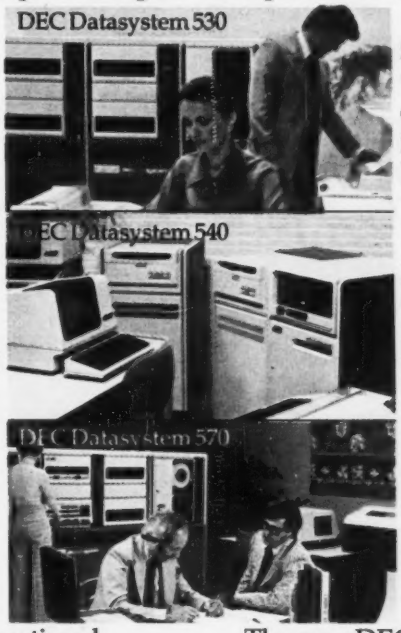

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IN DEPTH

(Continued from In Depth/7)
translated to assembled code and finally assembler and executed in machine code. One company, Western Digital Inc., a California-based microprocessor manufacturer, has designed a microprocessor that directly executes the intermediate code generated by the UCSD Pascal compiler.

A report produced by the Pascal Users Group indicates that a high degree of program portability is achievable among different machines no matter which implementation of the language is used.

Although Unix's C language, UCSD's Pascal language and the University of Waterloo's Thoth (B) language have various differences, these languages have a common design goal — achieving hardware independence. The knowledge of Pascal has spread a great deal. It is being taught in universities worldwide, and as a natural followup to this, it is currently being implemented on many machines.

It can be concluded that Pascal will be the predominant language used to achieve the goal of software portability.

The portability of Pascal software between different computers has been demonstrated by UCSD project and by the numerous independents who work mainly in the area of research and development for small or large companies or as part of a university. Pascal programs have been transferred among a number of microcomputers, minicomputers and large mainframe computers. For example, transporting from the LSI-11 to the Cray-1; from the PDP-11/45 and the PDP-11/70 to (and from) the Control Data Corp. CDC 6400; from the DG Nova/2 to the TI 990/10 has been accomplished with minimal effort.

A portable Pascal compiler has even been developed that enables programs written in Pascal to be run on computers that do not yet have a Pascal compiler. Once the interpreter is written and the portable compiler is compiled, the Pascal programs can then be compiled and executed.

The P-code instructions theoretically permit portability of the P-code to any machine that has an interpreter or translator for the level of P-code implementation. On the other hand, conformance to the Pascal language standard as described by Kathleen Jensen and Prof. Wirth in the *Pascal User Manual and Report* will achieve a high degree of hardware independence at the source level.

In addition, Pascal-P, a portable compiler written in Pascal, permits new Pascal implementations to be created fairly quickly on machines that do not have Pascal compilers. However, a P-code interpreter must be written and subsequently used to execute the P-code of the Pascal-P compiler.

Both the Thoth and the USCD Pascal Software System approaches are still considered experimental at this point. Both approaches have been shown to be technically feasible. However, they involve a lot of risk because they are new and experimental. Their capabilities have yet to be fully tested in a commercial environment.

The capabilities of the portable operating systems used must be matched against the abilities and functions of a "running" operating system and related software products. From the commercial and government standpoint, the barrier of general user acceptance must be acknowledged and tested.

At this early stage in their development, these approaches are also subject to changing requirements for either more efficient execution or additional features. Therefore, the approaches are continuously being enhanced and modified. Although a Pascal language standard exists (it is not a government standard) — and the revised draft of the proposed standard is expected to be accepted by the International Organization for Standardization later this

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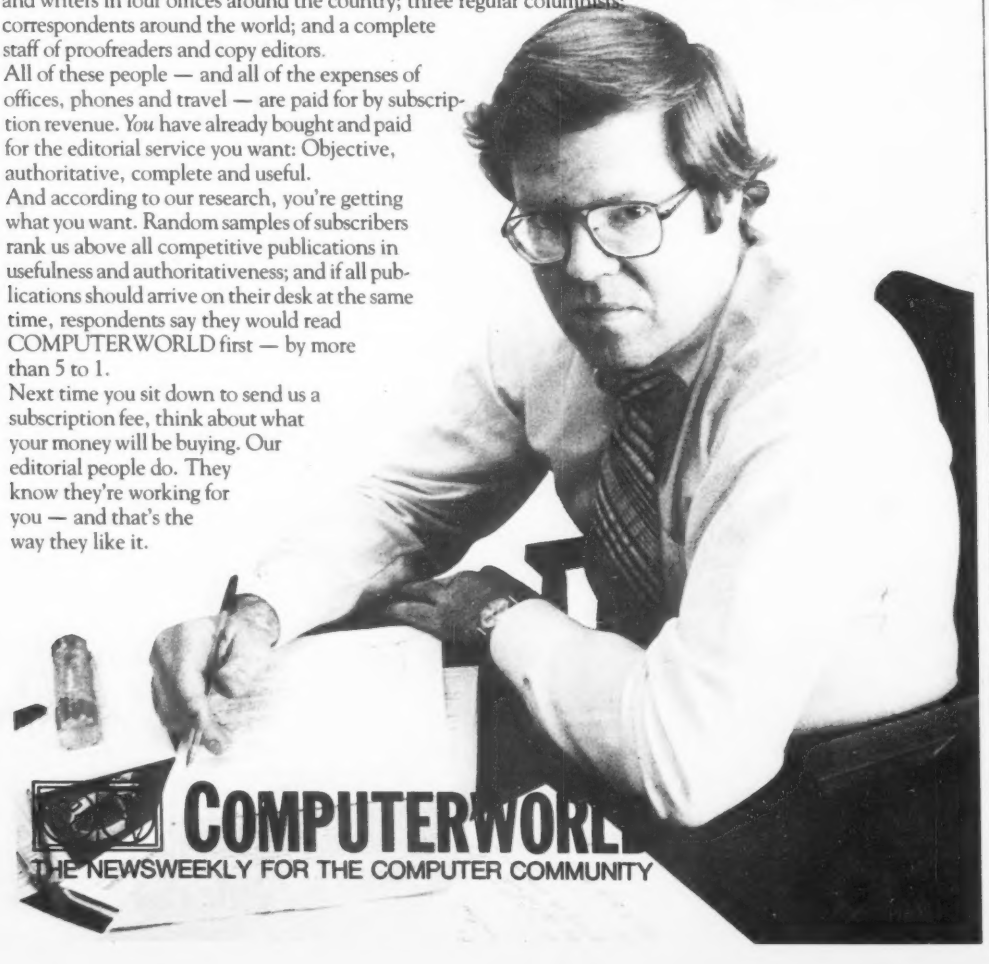

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year — the various and numerous implementations already resulted in the introduction of some machine-oriented idiosyncrasies.

Plug-compatible mainframe approach. This approach can be defined as the ability to transport software, in its entirety, from one machine to another machine composed of different hardware by means of emulation. The original machine is emulated on each of the target machines so that the same software can be run on both the original and target machines.

Some manufacturers, such as Nanodata Corp. have developed a "Universal emulator" that can emulate approximately 26 different machines, some concurrently. If this becomes a future trend among other hardware emulator manufacturers, this approach may be more feasible.

This approach in the majority of cases emulates only IBM 370's, although it provides reliability and a better cost/performance factor than IBM in many instances. However, this approach does not permit, as yet, software written for multiple and different computers to be run on a large number of emulator computers at an improved cost/performance ratio.

Nevertheless, this approach is worth considering because it does permit pseudo hardware independence and software portability. The universe it covers is quite large because it emulates the largest computer company's computer. Although the approach is technically feasible, its acceptance by the government and by the public sector is unlikely since it conflicts with the system of free enterprise an individual innovation in the computer hardware industry. A more real issue is the fact that some computer manufacturers may not permit their proprietary software to be run on another manufacturer's hardware and legal issues may arise.

Of the four technically feasibly ap-

(Continued on In Depth/12)

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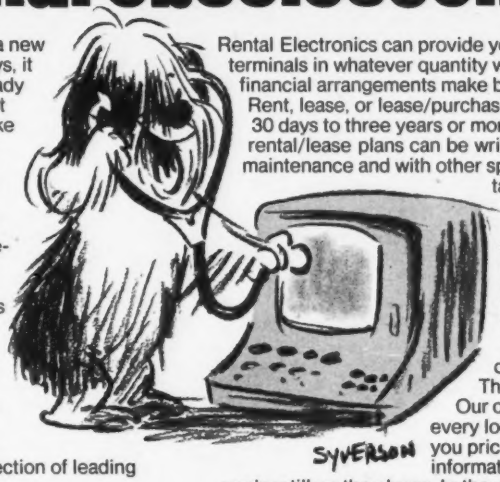

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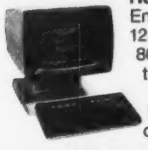

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CW 11/19

IN DEPTH

(Continued from In Depth/11)

proaches presented in this article, the first three deserve further investigation and analysis. The fourth, the plug-compatible mainframe approach, may be eliminated because it is too restrictive in its applicability to different types of hardware and because it limits software development.

Since the language standardization approach offers the least risk, its applicability over a selected and limited number of hardware and software environments should be studied further. The federal government reports available through the National Technical Information Society (NTIS) in Springfield, Va., and the federal Cobol standard (Fips PUB 21-1, dated 1974, published by the U.S. Department of Commerce/National Bureau of Standards, Washington, D.C.) should be obtained for this study.

The various computer manufacturers should also be contacted for information on their tools for both program and data conversion. Independent companies specializing in the area of conversion should be investigated, and companies uilizing Cobol preprocessors should be interviewed. And, most importantly, a compatible Cobol standard version that can be implemented on a wide range of different computer must be developed. The execution time efficiency of the incompatible Cobol for the representative computer systems must also be determined.

The intermediate language approach must be explored from the aspect of using a language such as Pascal or Ada and from the narrower approach of a specialized language implementation. Since the applicability and risk of this second approach falls between that of the language standardization approach and the portable system approach, it invites and requires further analysis. The concept of a P-machine that can be simulated by real machines in order to enable application program portability has been tested and proven in a somewhat limited environment that must now be explored further.

Although the third approach, the portable system approach, is considered experimental at this point, it may prove to be highly desirable. Additional details on the various portable operating systems' characteristics, potential for growth, maintainability and adaptability to change must be obtained and analyzed. The two design approaches, compiler and P-machine, must be analyzed for longevity, maintainability and degree of freedom from reliance on machine architecture.

In summary, it is recommended that a three-pronged, parallel, detailed investigation and analysis of the first three approaches be undertaken by government and industry groups whose goal is to achieve software portability and hardware independence. Each approach has proven to be technically feasible in achieving a degree of portability.

The applicability of each approach to current and future processing environments, the problems associated with each approach and the degree of software portability obtainable must be quantitatively answered before technical and economic feasibility can be ascertained. Therefore, we can say that software portability is achievable over a range of computer equipment if the software development process is carefully defined and controlled with this objective in mind.

Sal Razza is director of software services for Monchik-Weber Corp., New York. He directs the firm's customer software maintenance policies and managed the development of a real-time communications system designed to process security information from various option exchanges.

Razza has a B.S. and an M.B.A. from Iona College.

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Optical Storage Seen Medium of Future

By Howard A. Karten
CW Staff

CORONA DEL MAR, Calif. — Optical technologies offer the best hope for mass storage systems of the future and will probably be the dominant off-line information storage technology by 1987, according to a recent issue of *Computer and Data Processor Technology*, published here.

However, there appears to be little hope for the more immediate future, the report said, "since any advances [in storage] are most likely to be in the form of evolutionary improvements in magnetic tape areal density for present types of mass storage equipment."

Over the past three decades, the speed of processors has increased by a ratio of 2,000:1. But during the same period, magnetic tape storage densities have increased by one roughly 100:1, and even specialized tape used in laboratory instrumentation has increased by only 1,000:1.

"During this time, the speed of tape motion has increased by 2 or 3 to 1," the report noted.

Although optical technologies have held out the promise of increased density and speed for years, these promises have been largely unrealized, the report continued. However, it now appears that given time, and the willingness by users to change systems concepts and ingrained prejudices against nonreversible media and recording technology, optical storage could become a reality.

"Nonreversible media" refers to optical storage techniques that typically use a laser to record information on some form of medium, but the medium after that becomes "read-only." This is because lasers "burn" or otherwise physically alter the medium, which cannot then be restored.

(Continued on Page 61)

In Era of Discount Fares

Braniff CPUs Unravel Fare Restrictions

By Marguerite Zientara
CW Staff

DALLAS — In this era of discount fares, Braniff International Airways is using computer power to unravel the mysteries of lower-fare ticket restrictions and conditions for its customers.

Now serving 79 airports in the world including 57 in the U.S., Braniff can offer at least a half-dozen different fares for each trip, ranging from first class to the lowest discount fare, according to John Bonness, vice-president for computer services.

"You find fares that differ depending on how far in advance you make your reservation, when you get your ticket or what time of day you travel," he said.

Discount fares can also be valid on certain days, for a certain number of seats or if passengers spend a certain day or a certain number of days at their destinations.

When thrift-minded travelers demand the lowest fares to their destinations, Braniff reservations agents access one of three IBM 3033s for a CRT display of fares and restrictions to advise travelers of all options.

"Without the computer, Braniff would be unable to cope with complex air fares and the airline's growth," Bonness said.

Preflight Processing

Despite the many restrictions, revenue passenger mileage was up 51% for the first half of 1979 compared with the first half of 1978. And although mileage is up, agents must now answer three calls to make a sale instead of two, because of customers' "shopping around" instincts, Bonness explained.

"That, of course, adds to the number of reservationists you need to sell a seat on a airplane," he noted, adding, "If the agents have to answer three calls instead of two in order to make a sale, that means you need 50% more agents."

In real numbers, Braniff agents receive more than 2 million calls a month, up 62% from last year, Bonness noted.

The airline's three 4M-byte 3033s, upgraded from two 360/65s and a 360/75 early in 1979, "increase the number of calls agents can handle," Bonness said. The machines can process more than 200 messages a second, five times as many as the previous computers could handle.

In another area, computers have improved Braniff's passenger service and agent productivity in automatic ticketing and passenger boarding control operations. At ticket counters, the computer can print a ticket complete with passenger itinerary and fare in less than 10 seconds, Bonness said.

And through the airline's boarding control system, claimed to be the first of its kind in the industry, passengers get one-stop check-in and seat assignment to their final destination, even when one or more Braniff connections are required en route.

Besides expediting passengers' preflight processing, the systems have helped conserve increasingly costly jet fuel through precision flight planning. With a flight network covering 60,000 miles, up 21,000 from last year, Braniff has dramatically improved its fuel efficiency, according to Bonness.

Utilizing the latest weather forecast from the Nation Meterological Center, passenger load information from computer reservation records and anticipated cargo hauling for a flight, the 3033 evaluates the alternatives and, seconds later, produces a flight plan showing the most efficient routing and altitude for each trip, Bonness explained.

"We reduce everything to dollars and cents," Bonness said, "and determine the cheapest way to fly the airplane between two points."

For example, an airplane uses less fuel at higher altitudes because the air is lighter, Bonness explained. "The computer will tell the pilot exactly the altitudes to fly at, the angle and rate of climb and the rate of descent in order to optimize fuel," he added.

At flight departure time, the computer combines the computer-produced flight plan with the passenger, baggage and cargo loads to calculate the aircraft weight and center of gravity and ensure the flight is within safe weight and balance limits, Bonness continued.

In seconds, this information is sent to the captain either by radio or in printout form on board the plane so he can verify that his

(Continued on Page 60)

National Eye Banks Linked

System Unites Corneas, Recipients

Special to CW

ATLANTA — Emory University and the Georgia Lions Eye Bank here are using a mainframe to help locate corneal tissue for patients in danger of going blind.

The hardware is part of a nationwide network of 18 participating eye banks that maintain detailed biological data about corneas. The network began operating last January, according to Ron Wook, coordinator of information systems and programs at the Emory University Computer Center. Wood wrote the programs used in the operation.

The computer is important because corneal tissue is highly perishable — specimens can be preserved only for five days — and because many variables — blood type, for example — determine if a transplant will be suitable.

Planning for the system began in the fall of 1978, when the Georgia Lions Eye Bank approached Wood to see if there was a method of locating corneal tissue faster and more economically.

"Previously, when we needed tissue, we usually had to make several long-distance phone calls to eye banks all over the U.S. before locating what was needed. It was time-consuming as well as expensive," Jane Benson, executive director of the Georgia Lions Eye Bank, recalled.

"Finally, we felt that a computerized data base for a Tissue Inventory System (TIS) was the only answer. We received complete cooperation from Wood and Dr. Buell Evans, director of the Emory University Computer Center. Finally, the network became a reality on Jan. 8 of this year.

The 18 eye banks in the system are operated mostly by Lions Club organizations in different states in association with hospitals or medical schools in their

(Continued on Page 60)

Memorex Disk Subsystem Now Attaches to IBM 4331

SANTA ANA, Calif. — Memorex Corp.'s Business Systems Division has begun shipping its 3643 disk storage subsystem for attachment to IBM 4331 mainframes.

The subsystem was originally developed for attachment to the IBM System/3 and is thus not a completely new product. Memorex is believed to be the first vendor to ship plug-compatible peripherals for the 4331.

The 3643 consists of two spindles of Model 3640 disk drives and a controller. The device is 20% faster than comparable IBM drives but presents no problems when attached to the 4331, Memorex claimed.

Each module provides 140M bytes (70M byte/spindle) of storage capacity, with an average access time of 20 msec and a data transfer rate of 885,000 byte/sec. In its maximum configuration of 16 spindles, the unit offers a total capacity of 1.12G bytes.

The 3640 alone (two disk drives) costs $22,000 and leases for $555/mo on a 36-mo plan. The 3643 — two disk drives and controller — costs $28,300 or $785/mo on a three-year plan.

Toy Maker Coordinates Engineering Changes

By a CW Staff Writer

E. AURORA, N.Y. — By moving data about engineering changes from an off-line to an on-line system, Fisher-Price Toys here has cut the amount of time employees must spend looking for information — and saved $40,000 in this one area alone, according to company officials.

Fisher-Price has several manufacturing plants that make subcomponents which are shipped to other plants for incorporation into large assemblies. In that kind of set up, rapid, accurate communications of all kinds of data between outlying installations is essential.

The need shows up particularly in coordinating engineering changes among the different plants, partly because of the lead time needed to change both the process and parts ordering and control.

Several engineers in different locations are frequently involved in making changes and must often rely on each others' data — a situation similar to having several programmers each working on one module of a larger program.

Past Procedure

"In the past, an engineer would try to run a bill-of-material [BOM] change, and the associated records for that change might not have hit the system yet. The transaction would be rejected, and the engineer had to keep trying until the changes 'took,'" Arthur Gunson, manager of manufacturing systems, recalled. This meant personnel had to spend time looking for information in hard-copy listings.

"We were spending a lot of time looking up changes," Gunson said. "The records involved in many cases were deleted from the computer for one reason or another, and this required having to physically search through the files. Sometimes it took a couple of hours to track down something."

The problem was compounded because several locations made subassemblies and because sometimes several engineers were involved.

Problem Solved

Fisher-Price solved the problem by installing the on-line system last May. To its 524K-word Univac 1100/81 CPU it attached Univac UTS 700 remote job entry terminals that enable the outlying to communicate on-line with the plant so they can be assured of receiving timely, accurate information

"When we decided to install the system, purchasing was the only department in manufacturing systems with direct input, and our experience with real time systems was limited," Gunson explained. "The BOM and associated operation records system was the first one we developed in the multiplant environment."

The latter system produces listings that detail, for the plants, the precise order of steps and materials used in the manufacturing process.

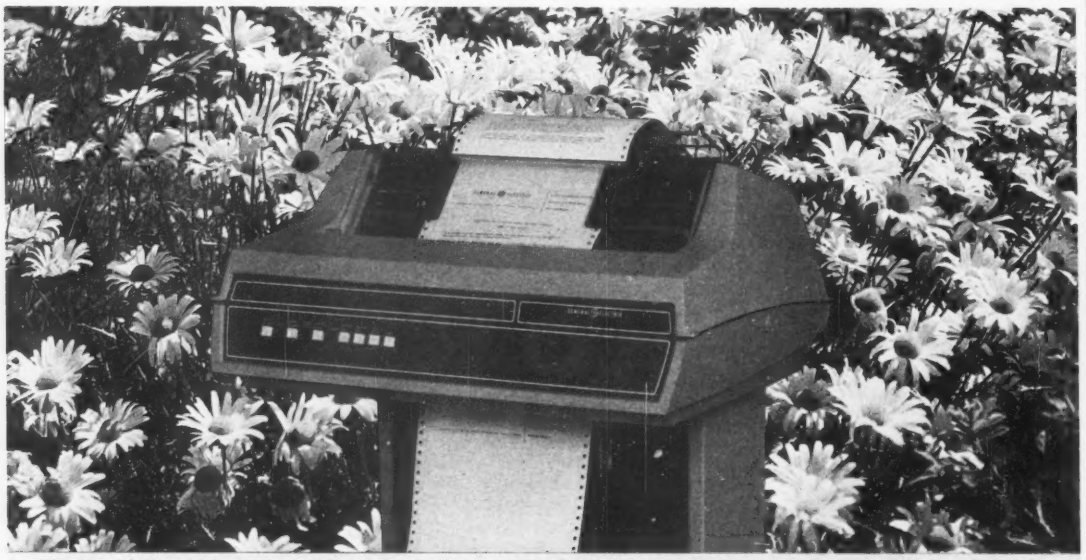
Smooth Transition

The transition from batch to on-line went smoothly largely because the systems department worked closely with the eventual users of the system, according to systems analyst Joan Behen.

"We wanted to make sure users of the system were comfortable with procedures before we went on-line. We worked with a test data base for two weeks on the BOM portion and a full month on the operations sheets," she stated.

Several factors influenced the decision to go on-line. The company's product line includes some 13,000 part numbers, and an average of 40 products are introduced each year. It became almost a physical impossibility to check all the forms received daily.

The firm's future plans include doubling the 524K-word memory on the 1100/81.



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User's CPU Heart of DP Room Security System

CEDAR RAPIDS, Iowa — a microprocessor-based security system to protect large computer rooms, as well as other industrial sites, is under development at Kenneth J. Braxton and Associates here.

Slated for January release, the system will use remote microprocessor sensors attached to a host computer via cable television or telephone lines. When activated, the microprocessor will scan the data base stored in the host computer to determine whether there is an actual emergency.

The CPU contains "a means of correlation" to determine the validity of the alarm, Braxton said.

When it detects an emergency, the unit will sound an alarm at a central monitoring site and send an alert to police or fire departments 3 to 5 sec after verification. The unit can detect, heat, smoke, fire, water or intrusion, Braxton said.

The system will cost $300 to $400. It can be attached to any brand of host computer because "there is no set software package developed. Programs on the host computer will have to be written to be compatible with the host.

"We will provide that service as part of the license fee, if needed by the client," Braxton said.

A prototype of the unit exists, but the company is redesigning it to work with another microprocessor. The company is also trying to work out some bugs in maintaining the security system if the telephone or cable TV service fails.

Braxton said those problems "would be taken care of," but would not say how the problem would be eliminated before the product goes on sale in January.

The system can only be used as an emergency reporting device and cannot be used to activate Halon 1301 or carbon dioxide fire-supressant systems.

The Braxton security system is applicable to centrally monitored security/alarm systems selective alarm condition reporting at multiple locations, Braxton said from 6924 Chelsea Drive N.E., Cedar Rapids, Iowa 52402.

Fleet of Vans, Repair Depots Added by Sorbus

KING OF PRUSSIA, Pa. — Sorbus, Inc., the maintenance firm, has introduced two programs that company officials say should speed computer service time.

The programs — a fleet of radio-equipped vans and the establishment of 12 repair depots in key areas across the country — will be expanded nationwide as quickly as practical, according to Stephen Keane, Sorbus president.

The van program "is a response to the energy crunch and the increasing demand by customers for faster service. If a technician finds he needs a special part after responding to a service call, he calls the van to bring him the part he needs.

"Traditionally, the technician might have to leave the job to get the part required."

The regional service depots will also mean faster service for Sorbus customers, Keane claimed, since printed circuits won't have to be shipped long distances for repairs.

Sorbus specializes in the service and maintenance of mainframes, peripherals and data entry and communications equipment. It maintains hardware manufactured by more than 60 vendors, a spokesman noted from 150 Allendale Road, King of Prussia, Pa. 19406.

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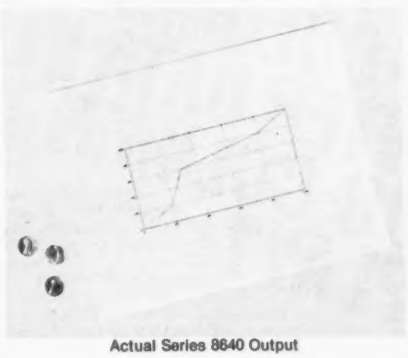

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Braniff Terminals Reflect 10-Year Evolution

DALLAS — Braniff International's usage of mainly Incoterm Corp. terminals is the result of an evolutionary process that began 10 years ago with IBM's "standard airline reservations terminals," according to John Bonness, vice-president for computer services.

At the time Braniff installed its IBM hardware, back in 1968, it used IBM Model 2948 and 2915 terminals. "At the time, the IBM terminals only made economic sense if you ran clusters of between 16 and 32 terminals off a single controller," Bonness explained.

"You can't do that in an airport because not every airport requires 16 terminals," he noted, "so we had a mixture of terminals." Besides the IBM clusters in Braniff's reservations offices, the airline used Sanders Associates, Inc. terminals in its low-volume airport "stations" where it needed stand-alone type terminals, he said.

As reservations offices expanded, and therefore needed more terminals, Braniff went with Incoterms and subsequently Icot terminals made by Microform Data Systems, Inc., Bonness said.

"Then, gradually, as we could see our way clear to do so, we replaced the IBM terminals," he noted. "In most cases we replaced them with the Icots because [like the IBMs] they run from controllers, and they're more efficient and more cost-effective if you run them in clusters and use one controller to run multiple sets," he explained.

While Braniff still uses Incoterms and "a few of the old" Sanders terminals, as well as the Icot equipment, it "got rid of the last of [the IBM terminals] just recently," Bonness said.

Upgrade to 3033s Allows Speed, Room for Growth

DALLAS — The beginning of 1979 brought the start of a new computer operation for Braniff International Airways, when it upgraded from two IBM 360/65s and a 360/75 to three IBM 3033s.

While that may seem like a big jump, "we were saturated on the 65s and there were many things we couldn't do," recalled John Bonness, vice-president for computer services at the airline.

"It is a large incremental jump, certainly, but we were looking for speed as well as capacity," he explained.

While Braniff now has "more computing power than we need," according to Bonness, "we feel the growth of the airline is such that we wanted a machine that would last us as long as possible."

Bonness estimated the present configuration would meet Braniff's needs for "at least five years."

As for its excess power, Braniff makes use of some of it by providing reservations service for about 20 smaller commuter airlines.

In addition, the airline has reaped its own benefits in the form of an on-line programming system. "Productivity of the programmers and much more rapid turnaround time on testing" are the major benefits of the on-line system, he noted.

Braniff's configuration includes one 3033 dedicated to reservations, one machine devoted to all applications that are not reservation-data-base-oriented and one used as a test machine. The test machine doubles as a back-up system for either one of the other 3033s.

"We have to have backup for our reservations system and the on-line commercial applications area," he noted. "Otherwise the airline almost shuts down."

Braniff CPUs Unravel Fares

(Continued from Page 57)

flight has been planned for the most efficient and safe journey.

Besides contributing to the pilot's peace of mind, the message fulfills a Federal Aviation Administration requirement for such a filing before any flight can be released for takeoff.

Engine Monitoring

Still another example of the computer's value is in monitoring engine performance, Bonness said. Each day, flight crews record in-flight engine instrument readings and send them directly to the computer complex.

The computer analyzes these readings of such things as engine temperature at particular times, fuel pressures, oil consumption and the status of hydraulic systems, Bonness explained. An airplane cockpit contains two sets of about 60 instruments that read such things, he pointed out as an indication of the amount of statistics maintained on each engine.

"On a daily basis, we plot those [figures] against a norm. Any deviation from norm is a signal to a power-plant engineer, who then makes a judgment as to whether an engine should be pulled prematurely" or whether other corrective action should be taken, Bonness said.

"If you pull an engine in a routine fashion it might cost you $25,000," he noted, "but if the engine fails, then you're looking at maybe $250,000."

So in addition to helping avoid mechanical delays and flight cancellations, the engine monitoring also lets Braniff utilize accurate and timely information for its mechanic-related decisions.

With the three computers located at Braniff world headquarters here at Dallas-Ft. Worth Airport, about 2,600 communicating Incoterm Corp. and other CRT terminals equip Braniff ticket counters around the world. Besides the U.S., there are terminals throughout Europe, Mexico, South America and Pacific, according to Bonness.

In addition, Braniff has about 300 Extel Corp. printers throughout the U.S. operating at speeds of 30 char./-sec. Nine Texas Instruments, Inc. printers located here operate at 300- to 9,600 bit/sec.

Corneas, Recipients United

(Continued from Page 57)

areas, Benson noted. The others are located in New York City, Rochester, N.Y., Florida, Iowa City, Baltimore, Dallas, Houston, Washington and other cities.

When a cornea becomes available, the key information is entered in the data bank of a Univac 90/80. Data consists of the name, address and 24-hour phone number of the eye bank offering the tissue; date and time the tissue was entered; method of tissue preservation; and medical information on the donor.

Donor information consists of his age and cause of death, results of a medical examination of the tissue and other, technical data.

Each cornea tissue is assigned a number in the data base by the system. To keep the information current, tissue not removed from the listing by an eye bank is automatically removed by the system after three days.

Last year, Emory University Hospital performed about 350 such transplants; an average of 10,000 are performed in the U.S. annually. Since the tissue bank was organized at Emory, it has been used about 80 times, Wood stated.

During the first quarter of this year, it was used about 50 times, for a total system operating costs of $620.49 — $36.50 per use.

Correction

In "Bus Line CPU Drives Reservation System" [CW, Oct. 29], the computer on which the system is based should have been identified as a Honeywell, Inc. Series 60 Level 66/Distributed Processing System, not a "DPS 1," Honeywell's internal designation.

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Scanner Boosts Processing Of Credit Card Sales Drafts

ELK GROVE VILLAGE, Ill. — Cummins-Allison Corp. has introduced a terminal scanner for processing credit card sales drafts.

The Model 4235 terminals scanner attaches to the firm's 5400 and 6400 distributed processing systems and is said to roughly triple the input speed that can be attained by an experienced data entry operator keying all digits of a draft.

"The 7B optical character recognition font is notoriously difficult to read on these drafts," a spokesman said, adding that the Model 4235 has achieved reject rates as low as 12% in field tests.

Faster Throughput

The fastest throughput an experienced operator entering all information on a draft (merchant number, authorization number, etc.) can reach digitally is approximately 525 to 560 document/hour, the spokesman said. By contrast, Cummins-Allison has observed rates from 1,500 to 1,600 document/hour with the terminal scanner.

Data entry is accomplished by entering the amount of the draft, the date (if not pre-set by the system) and the authorization code, if one is required. The operator then places the document in the read station, which reads the merchant number.

Any errors or misreads are highlighted on the CRT so the operator can correct them.

The scanner sells for $18,500. The controller for the device, which can handle up to four such controllers, costs $3,750. Cummins-Allison is at 2121 Landmeier Road, Elk Grove Village, Ill. 60007.

The Model 4235 Terminal Scanner

Optical Storage Future Medium

(Continued from Page 57)

Magnetic tapes can be rewritten many times during the physical life of the tape.

"One possible optical disk product is a 12-in. diameter, metal-coated disk storing 10 trillion bits. This is an areal density greater than 100 million bit/sq in.," the report noted. "This makes the problem of product and interface specification difficult, as it cannot be simply 'plug compatible' with magnetic products."

Four Problems

Although mass storage systems (MSS) have been developed to try to solve some of the problems of rapid retrieval of data from a large set of data, these suffer from four problems: they "create dramatically increased host overhead, require application programs to be modified to use the MSS, tie up expensive data paths to the host [and] limit operations in a mutlihost environment," the report said.

If and when optical storage becomes a reality, it will also show dramatic improvements for users in storage costs per megabyte, the report predicted. For example, storage on magnetic tape today typically costs $2 to $6 per 1M byte for total system cost. This should drop to $1 to $3 range for magnetic tape by 1983, and drop again to 10 cents per 1M byte by 1987.

Optical storage already exists in some primitive and often unwieldy forms, the report stated. For example, a California firm called Precision Instruments Co. produced a device called the 690 Laserstore approximately 10 years ago, and Lawrence Livermore Labs produced a laser recording device around an IBM-manufactured unit called the 1360 Photostore.

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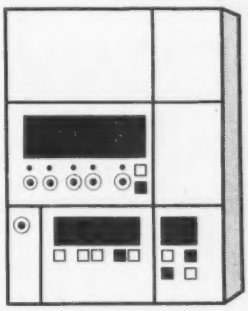

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Among Other Benefits

Data Entry Conversion Lifts Operator Morale

By Thomas J. Zillner
Special to CW

MANITOWOC, Wis. — My employer recently converted from an IBM 360/30 to a 370/115. In the process, we completely eliminated punch cards and realized several benefits.

These benefits include complete elimination of card purchases, less rerun time caused by out-of-sequence or missing JCL, elimination of unit records and a significant lowering of noise levels. As a result, operator morale is up.

My employer, Aluminum Specialty Co., completed the conversion over an extended period of time, in discrete stages, to minimize unexpected problems. Initially, three IBM 3742 and one IBM 3741 data entry units were acquired.

Since we still had the 360/30, which does not support diskette input/output, we rented a 3747 data converter. This device copies diskette data to tape and vice versa. This allowed us to begin eliminating our card file and retrain our data entry operators before delivery of the 370/115.

Of course, it was necessary to convert some programs to read data from tape instead of from the card reader and also to write data on tape instead of punching rejected transactions for correction.

At the same time, we had sold our unit record equipment — two sorters, a collator, reproducer and card punch — but we still had to sort cards occasionally.

To do this, we used the 360/30, which still had a reader and punch, and used a software package to do the sort. Although this was wasteful of cards and machine time, it was just a stopgap measure until we could completely eliminate cards.

Despite the obstacles, our experience shows that this kind of change can be made with a minimum of inconvenience if careful planning and the right tools, including software, are used.

Old Habits

Part of the problem with conversion is that old habits do not die easily. Many DP managers have used systems with cards for 20 or more years; IBM itself was reluctant to dissociate itself from a concept that helped put it where it is today, and this reluctance made it a late contestant in the modern data entry system marketing competition.

Punch cards remain tangible, human-readable pieces of paper, and many people are reluctant to lose control of what enters the computer. However, it is clear that the problems associated with punch cards make their continued usefulness rather doubtful.

We chose 374X equipment over key-to-disk or on-line data entry systems because a single equipment failure causes the loss of only one or two stations, not the whole system.

Another reason for choosing this hardware, despite the fact that the rental on them is higher than on keypunches, was the availability of local maintenance. This would not have been available from a key-to-disk unit we had considered.

When the 115 finally arrived, we used it and our old 360/30 together for approximately two months. The 360 was used for production, while the 370 ran job tests and program conversion (mainly from DOS to ANS Cobol). The software package Panvalet was particularly useful on conversion.

File Transfer

Once the programs and JCL were converted, we began transferring the master files. Our disk files on the 360's 2314 drives were arranged haphazardly, and we wanted to arrange them more logically and realistically for the 370's 3340 drives.

We did the actual transfer of files over a weekend when no production time was scheduled. We copied files from 2314 disks to tape and then loaded them onto the 3340s on the 370.

However, we still had the card reader, as well as the diskette reader, on the 370. To eliminate the card device, we decided to use the source library feature of IBM's spooler, Power/VS. This feature allows JCL to be stored in the source statement library and retrieved to control job execution through a single Power statement.

Once all the production JCL was placed in the source statement library, the card reader on the 115 was eliminated, as was the last card punch.

Vendor Support

IBM has supported the cardless system by changing a number of its utilities that required card input to accept instead diskette or console input, and it beefed up its Power/VS flexibility.

Although it is possible to operate a cardless system without a spooler, it becomes cumbersome to do so.

IBM and our other software vendors are cooperating with us by providing program updates and fixes on tape instead of cards.

Zillner is an operator with Aluminum Specialty Co., a subsidiary of Kraft, Inc.

Wabash Raises Some Prices

DES PLAINES, Ill. — Wabash Tape Corp. recently announced it has raised prices on its magnetic-coated products by 9%. The price increases will be effective Jan. 1.

The increases apply to both premium and standard brands of computer tape and to double-sided and dual-density flexible diskettes.

The price increase is a "direct reflection" of the increased prices the firm must pay for plastic products of petrochemical origin, a spokesman said. Petrochemicals form the base for magnetic coated products.

The firm last raised prices seven months ago, a spokesman noted. Since then, raw materials costs have risen faster than inflation. In addition, transportation costs have nearly doubled in the past year, the firm said.

Wabash is located at 2700 Des Plaines Ave., Des Plaines, Ill. 60018.

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Comparable to Mini-Based Systems

Digital Unveils Micro-Based Datasystems

MAYNARD, Mass. — Digital Equipment Corp. has unveiled two microcomputer-based Datasystem small business computers that are said to have nearly the processing speed and performance levels of DEC's minicomputer-based mid-range Datasystems.

The Datasystem 333 and 335 are built around DEC's PDP-11/23 16-bit microcomputer and have 128K bytes of memory, expandable to 256K bytes. They reportedly offer 2.5 times the performance of the PDP-11/03-based Datasystems and double the memory capacity.

Both machine packages feature a four-line serial interface, a VT100 CRT with Decform data format command keys and a variety of self-diagnostic capabilities.

The Datasystem 333 uses DEC's RX02 dual, double-density flexible disk drive, which provides a total of 1M bytes of on-line storage. The 335 employs two RL01 removable cartridge disk drives for a total of 10M bytes of data and program storage.

Both systems include a 180 char./sec matrix printer and utilize the CTS-300 commercial operating system with the Dibol-11 programming language, Isam file processing and Decform screen-handling software.

The 333 and 335 are capable of synchronous communications with other Datasystems and host computers, as well as batch communications with IBM mainframes using the RDCP 2780/3780 emulation package, a spokesman said.

Room for Expansion

To accommodate expansion, the Model 333 cabinet has room for a second dual RX02 floppy subsystem or an RL01 cartridge drive and controller. The 335 is already equipped for multiterminal operation and will support dual RL01 add-on disk drives in an optional expander cabinet for a system total of 20M bytes of storage capacity.

With full support, the Datasystem 333 costs $21,850, but is priced at $17,850 with just the CTS-300 operating system license. The 335 sells for $29,500 with full support and $25,500 with just the license. A similar mid-range minicomputer-based Datasystem, in comparison, costs about $38,000.

Additional details are available from DEC at 146 Main St., Maynard, Mass. 01754.

Mini Tests Spacecraft Batteries In Simulated Space Conditions

Special to CW

PASADENA, Calif. — The U.S. puts a number of satellites into orbit each year; if everything goes according to plan, it will launch its first space shuttle in little more than seven months.

JPL technician connects power and sense leads to spacecraft batteries before running simulation tests with an HP 1000 minicomputer.

However, some scientists here at the Jet Propulsion Laboratory (JPL) are more concerned with keeping these objects in space rather than getting them off the ground.

Using a minicomputer, the JPL researchers simulate space conditions and measure how much of a strain these conditions will be on the spacecraft's batteries. The computer calculates the degree of battery use for each day of a proposed voyage and then applies an equivalent power drain to the cells, test designer Tony Phillips explained.

The machine, a Hewlett-Packard Co. System 1000, also works out exactly what times the batteries are charged by the spacecraft's solar panels as they capture sunlight and whether enough power is generated to rejuvenate the tired batteries.

"This latest system was designed to test batteries under virtually any operating condition," Phillips said, noting that the computer has also been used to evaluate the lead-acid-type cells that power electric automobiles.

The HP 1000 minicomputer at the heart of this centralized facility has a semiconductor memory of 96K bytes and is equipped with the RTE III operating systems, which delivers a multitasking capability.

(Continued on Page 66)

CTI Business-Oriented Micro Features Operator Prompting

SANTA CLARA, Calif. — California Technology International (CTI) has unveiled an operator-prompting, business-oriented microcomputer that has a built-in digital tape cassette drive for loading programs and is said to be small enough to fit into a standard briefcase.

The Tel-It system was designed to interact with the user in a question-and-answer format. It can perform such business functions as inventory, scheduling, creating mailing lists, budgeting and cash flow management, a spokesman stated.

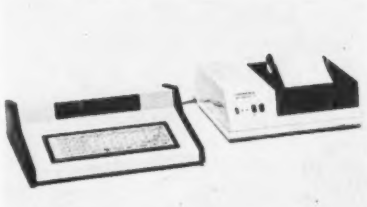
The Zilog, Inc. Z80-based unit has up to 32K bytes of random-access memory, as well as 4K bytes of read-only memory. Other features, besides the cassette drive, include a 76-key keyboard, a 16-bit alphanumeric display and a four-function calculator.

An optional Centronics Data Computer Corp. printer is available with the microcomputer.

Three Software Generators

The microcomputer package comes with three different application software generators.

The first, TPM1, is geared for "to do" applications and concentrates on message and timekeeping chores. The user can reportedly configure the system to be a reminder center or electronic note pad.



The Tel-It System

The second application, TPM2, was developed for data base management functions. The software organizes data by columns and can support up to 500 records, depending on their size.

The third generator, the TPM3, is actually an extension of TPM2. It allows users to perform arithmetic functions on the rows and columns of collected data and permits such applications as sales tracking, cost analysis and discounting, the spokesman said.

The Tel-It is available in two models, the 1016 with 16K bytes of memory and the 1032 with 32K bytes. Supplied with two blank cassette tapes, an instruction tape and user manuals, the microcomputers cost $895 and $1,095, respectively.

CTI is located at 2990 Gordon Ave., Sunnyvale, Calif. 95051.

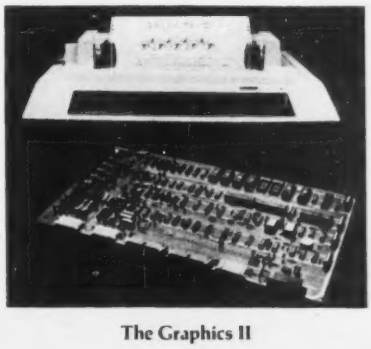
Option Converts Decwriter to Plotter

SANTA CLARA, Calif. — Selenar Corp. has introduced a plug-compatible option that converts Digital Equipment Corp.'s Decwriter II printer into a plotter.

The Graphics II hardware package replaces the Decwriter's existing electronics and includes the APL character set, forms control, horizontal and vertical tabs and an answerback function. By adding the hardware, the printer can operate in four different styles including boldface, double width and rotation — in four directions, a spokesman stated.

The option allows the printer to use Integrated Software Systems Corp.'s machine-independent Disspla and Tellagraf plotting software, he added.

The modification hardware costs $850 from Selenar at 2403 DeLaCruz Blvd., Santa Clara, Calif. 95050.



The Graphics II

Tape, Disk Processors Released for SEL 32 Line

FORT LAUDERDALE, Fla. — Systems Engineering Laboratories, Inc. (SEL) has announced a disk and tape processor for its 32 series computers that are both microprocessor-based and operate independently from or in parallel with the CPU.

The disk processor can handle 80M- and 300M-byte disk drives. It features a 16M-byte addressing capability, disk I/O queuing, command and data chaining, error correction code facilities and a dual-port operation with full software support.

According to a spokesman, a number of these features aid system performance during swapping, roll-in/roll-out and spooling functions.

The disk processor firmware supports overlapped seeks and angular position targeting for latency optimization, reportedly improving I/O performance when multiple drives are used.

The tape processor also features 16M-byte addressing and several other of the disk unit's hardware highlights. The drive is available with either a 45- or 75 in./sec transport, selectable in 800 bit/in. NRZI or 1,600 bit/in phase-encoded modes.

Both peripheral processors function under SEL's MPX-32 operating system and can coordinate up to four disk or tape units, the spokesman claimed.

The disk processor with an 80M-byte drive is priced at $27,000; the 300M-byte version costs $40,500. Additional disk drives cost $17,400 and $31,000 for the 80M-byte and 300M-byte models, respectively.

The tape processor with a 45 in./sec dual-density tape drive sells for $17,000, while the 75 in./sec package costs $21,000. SEL is at 6901 W. Sunrise Blvd., Fort Lauderdale, Fla. 33313.

Add-Ons For Eclipses Offer Cache

SANTA CLARA, Calif. — A multifunction add-on memory board designed for Data General Corp.'s Eclipse minicomputers and featuring an on-board cache memory has been unveiled by Intel Corp.

The 5150 board is totally compatible with several Eclipse models, including the S200, S230 and 5250, Intel claimed. The memory stores up to 128K bytes of data and has single-bit error correction capabilities, error-checking circuitry (ECC) and error logging and display functions, a spokesman noted.

The memory's on-board cache permits a 200 nsec access time, resulting in an increase in program execution speed, and has an interleaving capability that allows the CPU to access data from several memory boards simultaneously, he added.

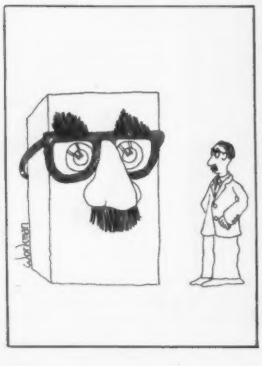
The on-board ECC not only adds correction facilities to the Eclipse processor to facilitate the location of faulty memory chips, but allows testing without software logging support, Intel said. The ECC function can be disabled with a switch on the 5150 control panel.

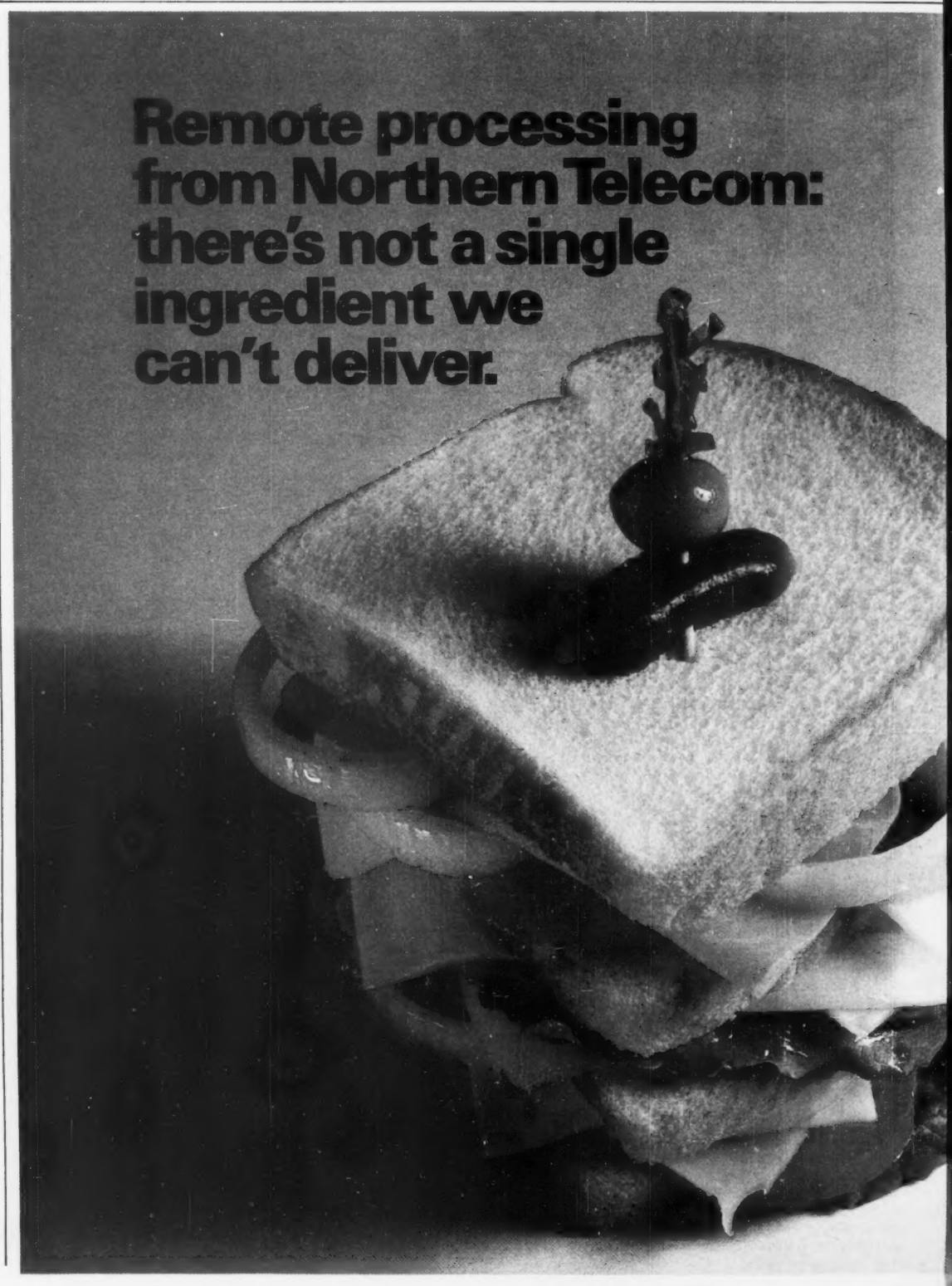
The add-on board costs $4,500 from Intel at 3065 Bowers Ave., Santa Clara, Calif. 95051.

Brochure Details Wise System

LOWELL, Mass. — Wang Laboratories, Inc. is offering a brochure describing the Wang Intersystem Exchange (Wise) message channeling system that is said to move data from the workstations of one system to the components of another.

Listing the systems applications, schematics and benefits, the brochure is free from the company at One Industrial Ave., Lowell, Mass. 01851.





The Series 7000 From Kennedy

Compact Winchester Drives Store 20M Bytes

MONROVIA, Calif. — Kennedy Co. has announced a series of compact Winchester disk drives that can store up to 20M bytes of data for mini- or microcomputer systems.

The Series 7000 drives have unformatted capacities of 4M bytes in the single-disk version, 12M bytes in the double-platter model and 20M bytes in the three-disk unit.

The disks have a data transfer rate of 5.5M bit/sec and a track-to-track access time of 12 msec. The drive's rotation speeds give an average latency time of 83 msec.

The units also have an inner track recording density of 5,280 bit/in., a spokesman claimed.

Recoverable read errors are one in 10^{10} bits transferred, he added.

Included with the Series 7000 are drive control and interface circuits for seeking, writing, reading and fault detection. The units receive write data in NRZ formats and convert it to modified frequency modulation (MFM) for recording.

Similarly, it decodes MFM to NRZ for reading, the spokesman noted.

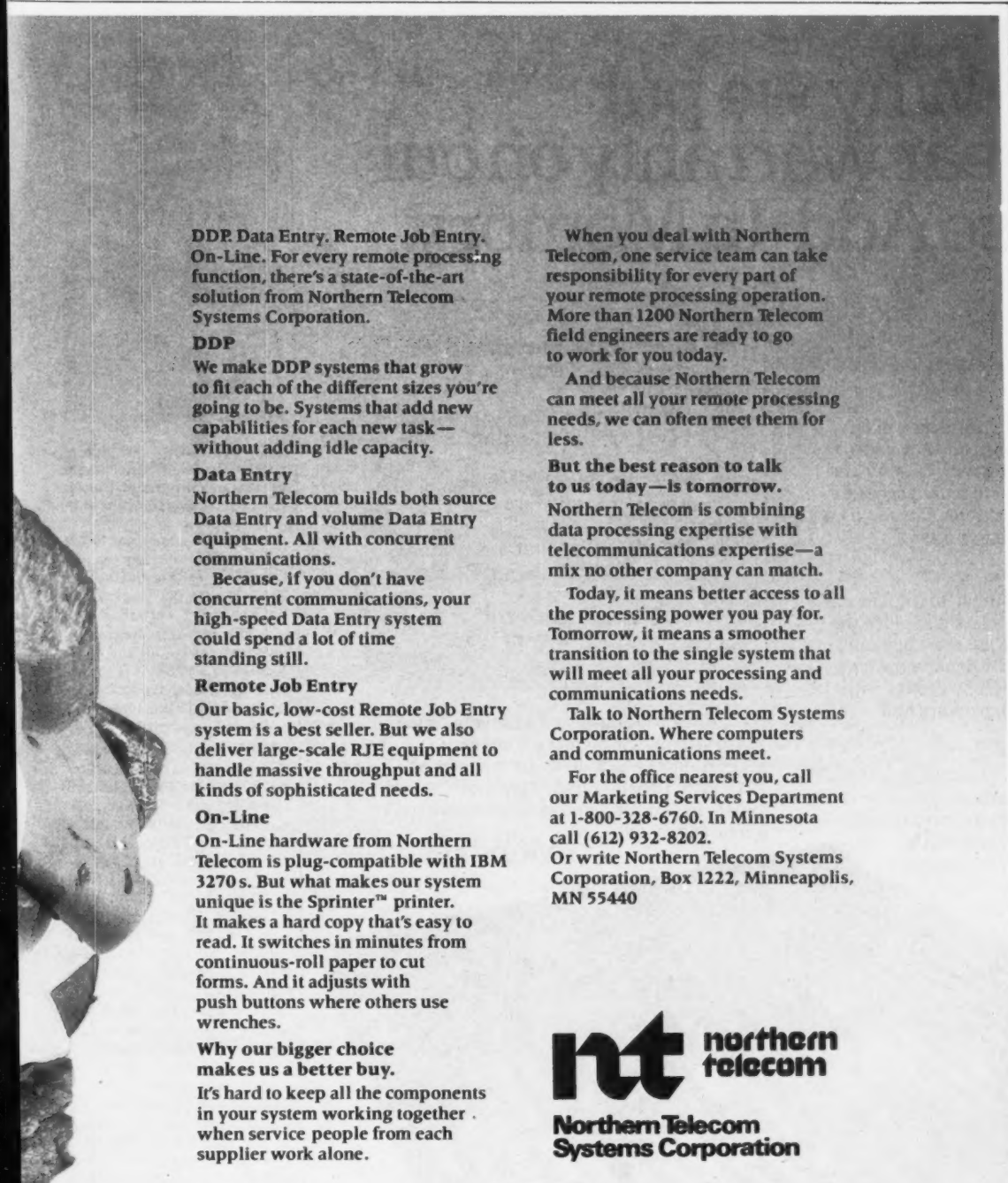
The 7000 units can be fitted with an optional formatter that controls seek and head selection, sector location and performs formatted and unformatted read and write operations, the spokesman continued. Other functions include burst-error correction, staggered sectoring and sector-level write protection.

The units can be mounted side-by-side in a standard

Series 7000

18-in. rack. They cost $2,100 for the 4M-byte drive, $2,300 for the 12M-byte drive and $2,650 for the 20M-byte device.

Kennedy Co. is located at 1600 S. Shamrock Ave., Monrovia, Calif. 91001.



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Xmark 2000 Gains Option

LA PALMA, Calif. — Geared for its 2000 series of Office Master word processing systems, Xmark Corp.'s one-pass multifont printing option increases the number of characters available to the user from 88 or 96 to 128.

Supplied with all models of Xmark's 2000 series and also marketed as a field upgrade to present systems, the printing option is included as part of an NEC Information Systems, Inc. 55 char./sec printer package.

The system does not require any special callouts or keys and there is reportedly no degradation in printing speed.

Multifont thimbles can be ordered from the printer manufacturer.

The printer and printing option costs $5,516, and the word processing system with the option included is priced at $14,900 from Xmark at Suite 119, 3176 Pullman St., Costa Mesa, Calif. 92626.

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Batteries Tested in Simulated Space Conditions

(Continued from Page 63)

The CPU is interfaced to the battery test chamber and to its 400 three-wire signal channels via an HP 6940B digital I/O multiplexer. The device contains a series of I/O cards.

To control, for example, a power supply, the mini "writes" an instruction on the appropriate output card, which then puts the commands into effect.

To obtain control status, the CPU addresses the desired input cards and "reads" the digital data, Phillips explained.

Testing and modeling programs are stored, ready to execute, on an HP 7905 disk drive with 14.7M bytes of memory. Test results and historical data are kept on an 800 bit/in., nine-channel tape unit.

Hard-copy printouts of test results are produced in real-time on a 110 char./sec teletypewriter. A 200 line/min printer produces specific information requests.

This particular system operates alongside two older, dedicated systems — also controlled by HP minicomputers — which originally did battery test work for earlier space programs.

Modeling Routine

According to the JPL's test designer, setting up a modeling routine is fairly straightforward. A technician enters details of the battery's operating environment into the CPU terminal or the teletypewriter.

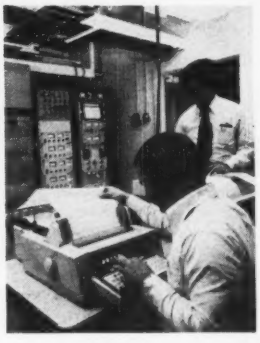
"These [details] include current values that relate to the amount of instrumentation the battery would be powering on each day of the mission, the predicted charging ability of the solar panels and details of the spacecraft's orbit," Phillips said.

Most batteries are tested continuously until the voltage output drops to a predetermined failure level; the CPU then automatically halts the test. Alternatively, the batteries' performance will be characterized over a period of time equivalent to the space mission's duration.

Ten different tests can be run simultaneously by the computer. Within the test, each individual cell that makes up the battery can be evaluated and its performance recorded.

One Major Program

Although the vast array of computer hardware and test



Tony Phillips (standing) checks results of battery tests as they are output by HP environmental simulation system.

equipment is important to the JPL's work, the key to the computer system versatility lies in the software, written by Phillips using Fortran IV.

Only one major program is used to manage all the tests. Known as TMGR, it is modular in nature, allowing it to be amended without having to be completely rewritten.

TMGR calls up numerous subprograms to take measurements, control voltages and print out data. For example, KNTRL is the subprogram that operates the control circuits fabricated at JPL; it receives its instructions from TMGR.

The CPU also houses other programs that can carry out specific tasks. For example, TMGR calls up a program to calculate the control parameters for a specific cycle based on the characteristics of the required orbit simulation.

"It is very easy to change or modify a program," Phillips continued. "The multitasking capability allows us to work on the source code of a program at the same time as it is actually running in a test. The next time TMGR calls up the program, it automatically substitutes the new version for the old."

To round out the JPL's testing system, the CPU is geared to store all current data in the event of a power failure or test chamber malfunction.

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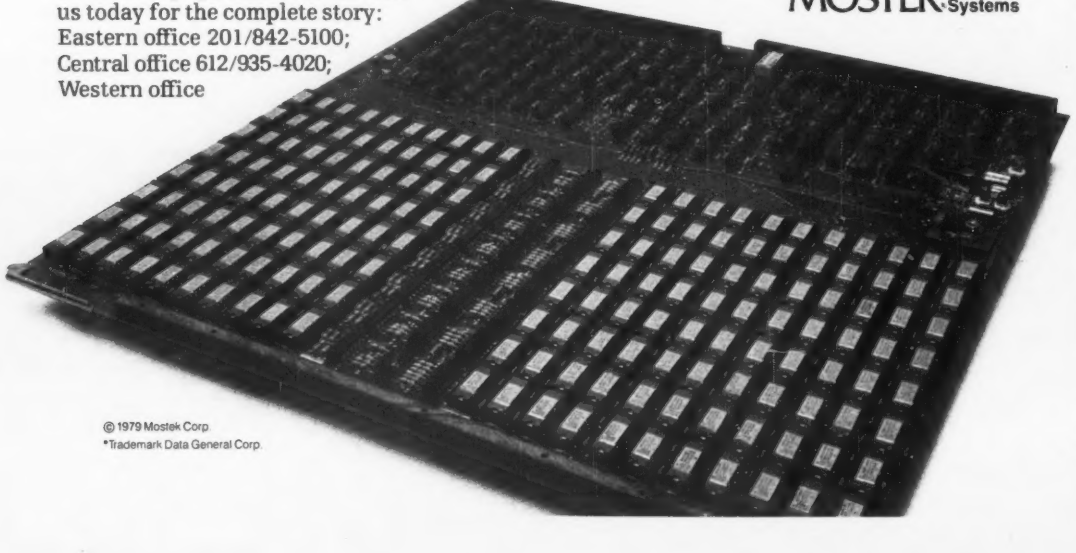

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At Issue: Leased Lines

CDC-KDD Battle Turns into Global Fight

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — An effort by Control Data Corp. to lease a voice-grade private line between the U.S. and Japan has boiled up into a major international confrontation over nontariff barriers.

One possible result is that new restrictions will be imposed by many other counties on the data communication services they provide to the U.S.

CDC asked the Japanese in April 1976 for a private line to connect its computer center in Lakewood, Ohio, with its service bureau subsidiary in Tokyo. KDD, the Japanese overseas carrier, agreed to provide the circuit if CDC would terminate it at a single computer within the U.S., specified in advance, and not change this termination without KDD's prior approval.

The Japanese also said that when Venus, a domestic packet-switched network, went into operation, CDC would have to use it, a change which would require abandoning the private line and paying higher rates. Switching to Venus also would prevent CDC from using proprietary communications control software which, according to the company, significantly contributes to the cost effectiveness of its on-line services.

CDC tried for the next 17 months to persuade KDD to modify these terms, but in September 1977 reluctantly agreed to them.

Latest Development

The next development occurred early this year, when three U.S. international record carriers (IRC) — Western Union International, International Telephone and Telegraph and RCA Global Communications — asked the Federal Communications Commission (FCC) for permission to interconnect U.S. customers with Venus.

CDC, along with two trade groups — the Computer and Business Equipment Manufacturers Association and the Association of Data Processing Service Orgnaizations — immediately objected. They said the FCC should not grant the applications until the Japanese lifted their private-line restrictions.

Not much has happened since then. The FCC is still considering the three IRC petitions, and there have been extensive discussions — between CDC and KDD as well as between Japanese and U.S. government officals — about the private-line restrictions. These restrictions are still in effect, although KDD now says CDC won't be required to interconnect with Venus; rather, it must "consider" this option. KDD will not lease additional private-line capacity to CDC, though, so the change may be more rhetorical than actual.

The CDC-KDD argument is part of a

(Continued on Page 70)

Carter Unveils Nine-Point Plan To Spur Industrial Innovation

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — President Carter has announced a broad federal program to spur industrial innovation in the U.S. through better information exchange, increased research and development spending and a streamlined patent and regulatory system.

In an Oct. 31 message to Congress transmitting his industrial innovation initiatives, Carter noted that "many of the world's leading industrial countries are now attempting to develop a competitive advantage through the use of industrial innovation.

"This is a challenge we cannot afford to ignore any longer," he declared in outlining a nine-point program that represents "only an early skirmish in what must be a continuing battle to maintain the technological strength of the American economy."

The program springs from a "domestic policy review" begun in April 1978 under the direction of former Commerce Secretary Juanita Kreps [CW, Feb. 5]. The review included consultations with hundreds of industry, labor, academic and public interest groups and officials, including executives of Control Data Corp., Honeywell, Inc. and Datapoint Corp. [CW, Feb. 26].

The Carter proposals were presented to a special joint meeting of four Senate and House of Representatives committees October 31 by Kreps, Presidential science adviser Dr. Frank Press and Dr. Jordan Baruch, assistant Commerce secretary for science and technology, the policy review chairman.

Several of the Administration's proposals coincide with various pieces of legislation under active consideration in both houses of Congress, with the active support of the electronics industry, on subjects such as federal patent policy, venture capital formation and tax and regulatory incentives to promote small innovative companies and in general increase U.S. productivity and industrial innovation.

As outlined for the congressional committees by Press and Baruch, the nine areas for specific government action mandated by Carter are:

(Continued on Page 68)

Many Unanswered Questions

Dealers Confront IBM on 4300

By Marcia Blumenthal
CW Staff

HOUSTON — Will IBM 4341 processors built with 16K chips quickly become obsolete? What will be the performance characteristics of a 4300 mainframe running with a 3370 disk subsystem? Has IBM stepped up delivery to some users in order to beat third-party vendors out of sales?

These concerns topped the unanswered questions list of computer dealers who gathered here recently for the annual meeting of the Computer Dealers Association (CDA).

During a well-attended special workshop on the 4300, outspoken CDA members confronted IBM representatives with a wide range of questions, using the event both as a forum and a sounding board for discussing common problems and experiences.

One of the key fears dealers expressed is that 4341s built with 16K chips will not be speedily upgradable once IBM reaches production capacity for 64K chips or can obtain them reliably from a second source. Although IBM intended to use 64K chip technology consistently for the 4300 series, the

(Continued on Page 74)

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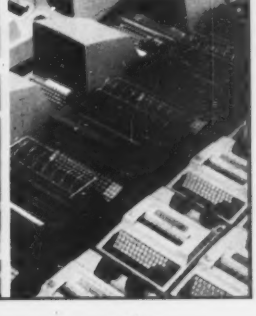

Nine-Point Program Designed to Spur Innovation

(Continued from Page 67)

• *Information Transfer.* In fiscal 1981, $1.2 million will be spent to establish a center within the existing National Technical Information Service (NTIS) to collect and distribute to industry technical information from federal laboratories and R&D centers. NTIS will also spend $1.8 million the first year to collect, translate and disseminate foreign technical data.

• *Technical information.* Included in this proposal is $20 million for the National Science Foundation (NSF) to establish joint government-industry R&D centers at universities and nonprofit research facilities.

• *Patent System.* Besides streamlining U.S. Patent Office procedures, the Administration will propose legislation to resolve the 30-year dispute over the licensing of government-owned patents for commercial exploitation.

The government will retain title to its patents but will provide exclusive licenses to companies in specific fields. The licenses will revert to the government if a firm fails to commercialize the inventions.

Carter also said he supports retention of patent ownership by small businesses and universities, as recommended in current legislative proposals, "in recognition of their special place in our society."

• *Antitrust policy.* The Justice Department will clarify its position on R&D collaboration among firms. Also, the Justice and Commerce Departments and the Federal Trade Commission will begin discussions with industry representatives to "dispell the notion that antitrust policy inhibits innovation" and to improve government-industry communication in this area.

• *Small business development.* NSF support of small, innovative firms will gradually increase from the current budget of $2.5 million a year to an eventual $150 million a year. Also, two "corporations for innovation development" will be established to provide equity funding for firms to develop high-risk innovations.

• *Federal Procurement policy.* The office of Federal Procurement Policy will alter regulations in order to remove barriers inhibiting federal purchases of innovative products. Where possible, performance specifications will be substituted for design specifications and product costs will be evaluated on a lifetime instead of purchase price basis.

• *Government Regulation.* Federal regulations will be examined with the promotion of innovation in mind. Agencies will be encouraged to streamline rules and speed up approval processes for products identified as innovative.

• *Labor-management.* The Commerce and Labor Departments will develop a national labor/technology forecasting system to predict technological changes within specific industries and their impact on the work force.

• *Climate for innovation.* The government will develop a climate conductive to industrial innovation. The National Productivity Council will monitor innovation, develop policies to encourage it, assist agencies in implementing those policies and pursue the removal of legislative or administrative barriers to innovation.

Carter also said that when evaluating fiscal policies for fiscal 1981, he will consider possible changes to tax laws with an eye toward increasing tax incentives to spur industrial innovation.

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Supershorts

The Association of Data Processing Service Organizations, Inc. has retained Harlan M. Blacke, professor of law at Columbia University, to act as special counsel on antitrust matters.

– – –

Computer Services Corp. has filed a suit against Citibank, N.A. of New York City and John C. Heimann, comptroller of the currency in Washington, D.C., to enjoin the bank from acquiring the assets of Computer Professionals Unlimited. Computer Services alleges that Citibank's acquisition of that firm would put it in the business of selling and providing DP services, which is not a legally authorized function of national banks.

– – –

Scientific Time Sharing Corp. has changed its name to STSC, Inc. "For the past several years we have been providing integrated computing services used more extensively for financial planning and reporting than for any other applications," the firm's president Daniel Dyer said, explaining the name change.

– – –

Tandberg Data, Inc. has changed its name to Innovative Data Technology. The name change follows the purchase last month of Tandberg by the company's management. The company was formerly a U.S. subsidiary of Tandberg Radiofabrik of Norway.

– – –

Mohawk Data Sciences Corp. (MDS) has established three marketing groups to support the firm's worldwide growth efforts. The three groups are the MDS North American Marketing Group, the MDS Europe/Africa Marketing Group and the MDS Pacific and South American Marketing Group.

Protectionist Trend Cited

U.S. DP Firms Seen Balked Abroad

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Growing restrictions by foreign governments on the operation of U.S. multinational computer services firms were the subject of an extended discussion at a recent meeting here of the Computer Law Association (CLA).

The restrictions are of two basic types: measures that hinder U.S. companies that want to establish subsidiaries or buy into firms already established in other countries; and regulations limiting the kinds of data that can be transmitted across international borders.

The justification for both restraints is that they protect domestic DP firms against foreign competition, increase employment opportunities, safeguard the personal privacy of the foreign country's citizens and protect the sovereignty of its government.

Investment restrictions are being imposed primarily by Canada, France and Japan, according to Richard L. Crandall, president of Comshare, Inc.

A U.S. company that wants to establish a subsidiary in Canada, for example, frequently cannot get the government's permission to do so because the subsidiary offers "insufficient benefit." Comshare is one of the firms turned down on these grounds, Crandall told the CLA meeting.

In France, a U.S. company that wants to enter the domestic marketplace typically is told its aplication is "unacceptable as filed," Crandall said. This happens repeatedly, leading to endless delays and ultimate discouragement.

The Japanese often refuse to lease communication circuits to American computer services vendors unless they are willing to accept "prohibitive restrictions." For example, Tymshare, Inc. of Cupertino, Calif. spent 16 months trying to lease a telephone circuit between its U.S. computer center and the offices of its Japanese subsidiary, Crandall reported.

Government Users

In France, Canada and Japan, government agencies are encouraged to purchase only domestic suppliers, Crandall said.

Government users comprise 15% to 20% of the computer services market in most countries, so this policy represents a significant handicap for U.S. vendors — particularly since it often persuades non-government users of on-line DP services to do likewise.

To cope with this growing protectionist trend. The U.S. must consolidate its present fragmented telecommnications policy-development organization into a single government agency, according to Phil Onstad, manager of telecommunications policies at Control Data Corp.

Such an organization should have "exclusive authority to establish U.S. international telecommunications policy; . . . negotiate with its couterparts in, and the international carriers of, foreign countries; and enforce international telecommunications policies on behalf of the U.S., its carriers and its users, Onstad said.

Legislation along these lines was recently submitted to the House and Senate communications subcommittees, as amendments to the bills they are currently considering that would revise the Communications Act of 1934.

Itel to Lose $150 Million

SAN FRANCISCO — Itel Corp. is anticipating approximately $150 million in previously unannounced asset write-downs and loss reserves for its third quarter, amounting to a total loss for the quarter of approximately $175 million.

Nearly all of the reserves and write-downs result from decisions to discontinue parts of Itel's business, the company disclosed. As of Oct. 1, its domestic and European IBM plug-compatible mainframe operations were transferred to National Semiconductor Corp. in Santa Clara, Calif.

Itel also decided to seek plug-compatible operations buyers in other parts of the world. As a result, Itel decided to write down assets associated with DP to estimated liquidation value and, at the same time, create reserves to cover estimated future losses.

Four Indian Cities to Host Equipment Catalog Exhibit

WASHINGTON, D.C. — U.S. computer and peripheral equipment manufacturers can participate in an equipment catalog exhibition to be held in several cities throughout India — a country reported to be a burgeoning market for U.S. computer products over the next several years.

The exhibition is sponsored by the U.S. Department of Commerce and was designed to assist American firms in introducing or gaining added exposure for their products in this overseas market, according to a spokeswoman.

In the period from 1979 to 1983, India will require imports of more than $300 million worth of computers and peripherals to keep up with worldwide technological advances, the Commerce Department predicted. Peripheral equipment needs from minicomputer and microcomputer manufacturers are projected to reach $48.5 million during the 1978-1981 period.

The exhibition will take place in New Delhi, Calcutta, Hyderabad and Bombay between Jan. 14-25, 1980. To participate, companies should mail two copies of their product catalogs for each city to Catalog Exhibitions, Special Promotions Division, U.S. Department of Commerce, Washington, D.C. 20203 by Nov. 26, 1979. The exhibition cost for all cities is $120.

Executive Corner

- Geoffrey Groom has been named vice-president of marketing for Omnidata.
- Gerald P. Smith has been named vice-president of sales for the Leasing Division of Greyhound Computer Corp.
- Norman F. Parker has been elected to the board of directors of System Development Corp.
- Robert Sanekoff has been named assistant to the president of Magnuson Systems Corp.
- Brendan (Russ) Morgan has been named executive vice-president of Warrex Computer Corp.

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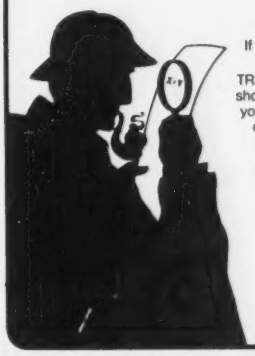

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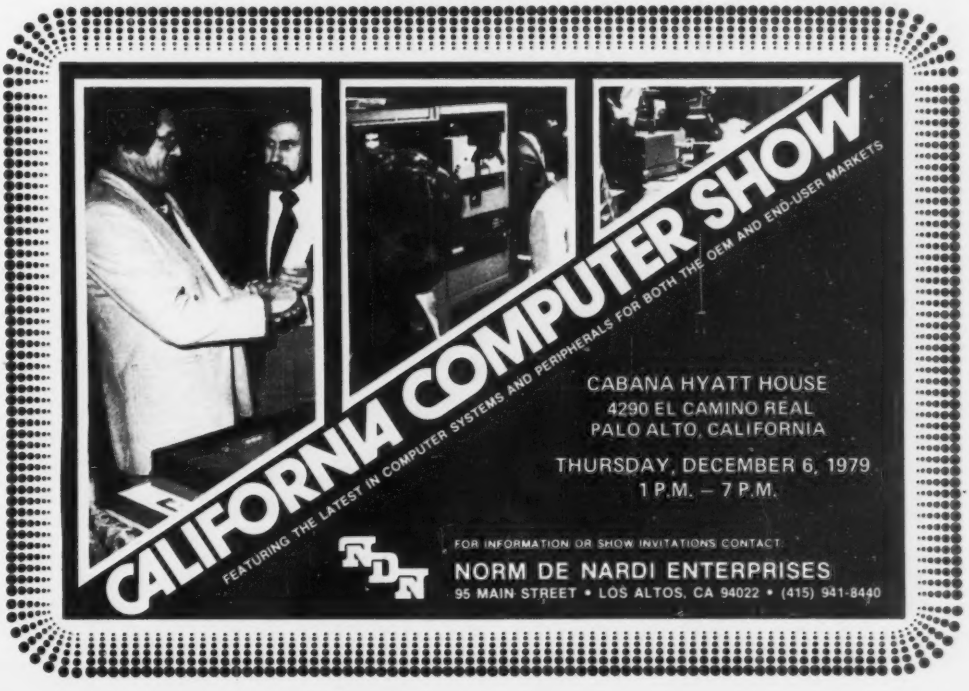

New Agency Proposed For Telecommunications

CW Washington Bureau

WASHINGTON, D.C. — The threat to U.S. data communications users posed by Japanese and European tariff restrictions might be less serious if the U.S. government had a central agency for developing international telecommunications policy.

Today, that policy is being developed by a number of agencies, including the Federal Communications Commission, State Department, Defense Department and the National Telecommunications and Information Administration, which is the President's chief telecommunications adviser.

Control Data Corp., the Computer and Business Equipment Manufacturers Association and the Association of Data Processing Service Organizations are trying to change all this. They have proposed legislation consolidating international telecommunications policymaking activities within a new State Department agency that would include representation from U.S. users of international circuits.

Phil Onstad, CDC's manager of telecommunications policy, believes his company's current troubles with the Japanese, which have been described in statements accompanying the proposed legislation, will help arouse enough support to eventually get the legislation enacted. The immediate outlook, however, is not very hopeful.

Service Firms Battling Barriers Against U.S. Telecommunications

(Continued from Page 67)

much larger dispute that has been going on for several years between the U.S. and Europe regarding data communications services. The European postal, telephone and telegraph (PTT) administrations have developed sophisticated networks, as in Japan, to tap a growing domestic demand for data communications. Along with that development have come various restrictions on private-line services designed to persuade users to switch to the new facilities.

Usage-sensitive rates, for example, have partly replaced full-period rates in many European tariffs. While usage-sensitive rates may benefit customers whose data traffic is relatively small, they increase cost substantially for volume users such as U.S. computer services firms that operate overseas.

This is probably not accidental; many PTT offer on-line data base retrieval and data processing services that compete directly with those provided by U.S. firms.

KDD Solution

KDD denies that the restrictions it has imposed on CDC and also on Tymshare, Inc., another U.S.-based computer services vendor, are aimed at protecting Japanese suppliers of competing services. Like the Europeans, KDD says it's worried about unauthorized use of third-party networks.

The basic problem, as the PTTs see it, is that two subscribers to an on-line DP service could use that network to communicate with each other instead of leasing a separate circuit — thereby depriving the carrier of legitimate revenues.

KDD's solution — terminating the vendor's circuit in a single, specified computer — limits the amount of message switching a user can perform, thus reducing the possibility of unauthorized use.

The Real Reason

Phil Onstad, manager of telecommunications policies for CDC, pointed out, however, that all U.S. computer services vendors operating overseas prohibit customers from using their networks for anything but data processing. A specific contract provision says the customer's service will be terminated if the network is used to transmit unrelated messages. If KDD is really worried about unauthorized use, its single-termination restriction won't solve the problem, Onstad said, since customers linked to that computer could still send messages to each other — if the vendor allowed it.

The real reason for the single-termination restriction is to limit CDC's ability to compete in the Japanese market, Onstad contended. Another aim is to force the company to interconnect with Venus.

As CDC explained to the FCC, "The Japanese restictions on transfer of data effectively limits use of the circuit to the two services performed at the Lakewood center (Call/370 and Call/Plus). [CDC] therefore cannot offer in Japan its other services. . .performed at data processing centers other than Lakewood.

"In addition, the restriction impairs [CDC's] ability to offer customers in Japan the back-up reliability features of its data processing system." Since the single-termination constraint is not imposed on Japanese competitors of CDC, they gain a competitive advantage, the company added.

KDD has told CDC the single termination restriction will be lifted once the company interconnects with Venus — a pretty clear indication the Japanese are trying to drum up business for their new network. CDC believes that another indication is provided by the three IRC applications now being considered by the FCC, which propose to connect U.S. users to Venus.

"The authorizations requested by the U.S. international record carriers are necessary for the offering of Venus service between Japan and the U.S. When Venus commences, it appears clear that the Japanese KDD may seek to terminate existing basic private-line service.

"Thus, grant of the applications can severely curtail or eliminate existing service and replace it with usage-sensitive, packet-switched service," CDC said.

PTTs in Europe are certainly watching this drama closely, since they are also in the on-line DP business, have made big investments in data communications networks and are in a position to employ the Japanese strategy.

Pertec Accepts Acquisition By West German Firm

LOS ANGELES — Pertec Computer Corp. has accepted an offer from Triumph Adler, a West German office equipment firm, to acquire the American company for cash in the amount of $16.50 for each outstanding share of Pertec common stock.

The agreement covers Pertec's 7.2 million outstanding shares, amounting to a total of nearly $120 million. The acquisition will be accomplished through a cash tender offer by a U.S. subsidiary of Triumph Adler and will be followed by a cash merger, according to Pertec President Ryal Poppa.

The tender offer is expected to begin this month and will be completed by January.

The West German firm's offer topped a previous bid by North American Philips, which made Pertec a tender offer to buy as much as 45% of Pertec's stock for $56.1 million, or $15 a share.

Before accepting Triumph Adler's offer, Pertec indicated it would not be adverse to a bidding war between the two companies. Such an event apparently failed to materialize, however, and Pertec's board of directors approved the agreement with Triumph Adler.

The tender offer and merger is subject to the satisfaction of various conditions including, in the case of the tender offer, tender of a majority of Pertec's outstanding shares. Triumph Adler reportedly indicated that no West German exchange control or other approvals remain to be obtained.

Triumph Adler, based in Nurnberg, West Germany, is controlled by Volkswagenwek AG, the auto maker.

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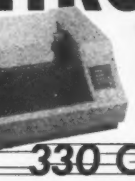
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Intelligent Copier/Printer Industry Profiled

SAN JOSE, Calif. — The U.S. intelligent copier/printer (IC/P) industry will experience a 107% compound annual growth rate in revenues through 1984 and shipments will increase by 160% compounded annually over the same period, according to a market analysis conducted by Creative Strategies International (CSI), a market research and consulting firm.

IC/Ps will undergo a series of evolutionary changes, becoming a significant link in corporate information systems, CSI predicted.

Within the next five years, IC/Ps will become multifunctional units. They will accept both hard copy and electronic signal input, have resident fonts and formats, incorporate I/O devices to allow communications within a network, have high-speed laser or fiber optic/CRT electrophotographic imaging systems and process large amounts of temporary buffer memory, the report indicated.

Although no first-generation product currently available meets all those requirements, the report noted that one or two are close.

Companies entering the market will be those with expertise in relevant technologies and those whose markets will be affected by the introduction of IC/Ps, CSI indicated.

In the industry's early years, marketing strategies will follow previous patterns so that DP companies will sell IC/Ps for DP applications while firms with word processing experience will sell in word processing environments. These distinctions will eventually disappear as the two areas converge, the report noted.

Fully evolved IC/Ps will eventually realize sales volume through their use as communications links but until that time, sales will be primarily drawn from the market share of current printers.

CSI's report provides an analysis and five-year sales forecast in which figures are given in units and dollars for low value-added ($7,000-$15,000) and high value added ($35,000-$100,000) product price classes as well as for the anticipated initial application segments. CSI also analyzes communications and its impact on the market and discusses other relevant technological developments. "Intelligent Copiers/Printers" includes assessments of current suppliers and potential entrants into the market and sells for $995 from CSI at Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

CCT Becomes Parent Company Of Infomag

SANTA BARBARA, Calif. — A plan for reincorporation under which all outstanding shares of Information Magnetics Corp. (Infomag) have been converted into shares of Computer & Communications Technology Corp. (CCT), a newly formed corporation, was approved by shareholders of Infomag.

Under the new plan, Infomag and its subsidiaries have become subsidiaries of CCT.

The formation of CCT as the parent corporation provides a corporate name which links the company with the computer and communications markets its serves and with its future product direction, according to E.T. Bahre, chairman and chief executive officer. The company's reorganization also provides an organizational structure permitting more effective overall management of each of CCT's several business and subsidiaries, Bahre said.

CCT subsidiaries include Infomag, a manufacturer of magnetic disk recording heads for use in DP systems; Zeta Laboratories and Solid State Sources, engaged in developing and manufacturing high-technology microwave components; and Data Peripherals, which is developing and plans to manufacture peripheral equipment for the minicomputer market.

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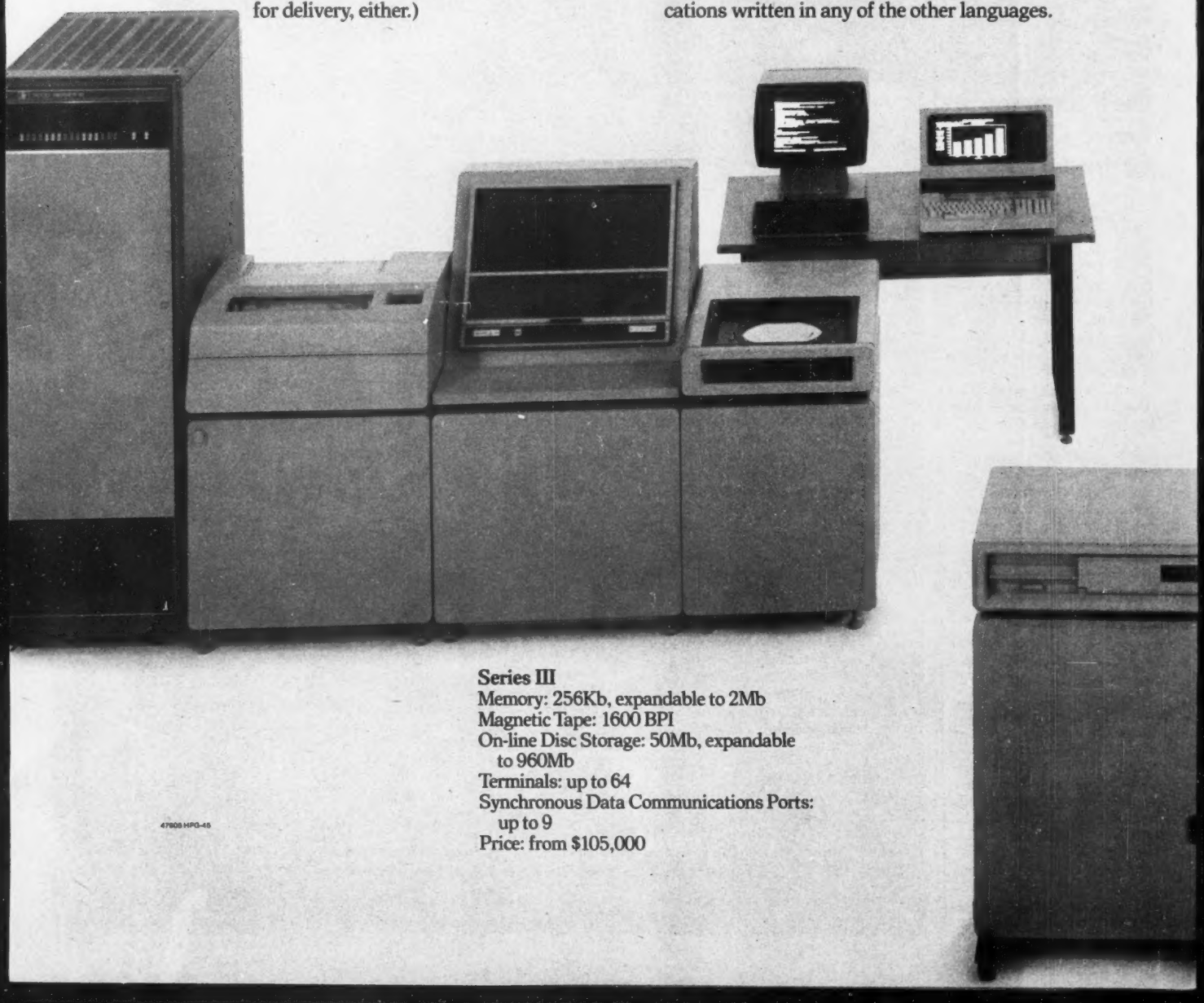

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Boole & Babbage Redesigns Software Business

SUNNYVALE, Calif. — Boole & Babbage, Inc. has restructured its systems software business along the product lines of performance management, resource accounting and security management.

The move was made to accommodate past growth and continued expansion, according to Michael S. Patitucci Jr., president.

Thomas M. Hoger has been named vice-president and group manager heading the Performance Management Group. John E. Zipp has been named vice-president and group manager to head the Resource Accounting and Security Management groups.

The company has also named three national sales managers: Bruce A. Ruks, NSM, performance management products; Frank J. Sweeney, resource accounting products; and Michael Reagan, security management products.

All three will report to Dennis S. Crow, who continues as vice-president of sales.

The Performance Management Group will target the needs of senior systems programmers, senior systems analysts and technical managers to monitor and tune their systems; the Resource Accounting Group will focus on the accounting and resource management needs of data center managers; and the Security Management Group will target the requirements of security managers and auditors concerned with protecting and controlling the use of computerized information and resources.

Dealers Confront IBM With Questions

(Continued from Page 67)

firm will be building some 4341s with 16K chips during 1980 because demand for the processors outstripped the ability to produce the chips, Roy Stanton, an IBM industrial relations staffer, noted. The 4331s will be built with 64K chips exclusively.

Stanton assured dealers that regardless of the type of chip used, the 4300s would have no performance, software, power or coding differences.

IBM confirmed that users with 4300s with 16K chip technology would have to upgrade to additional memory built around 16K chips. In an attempt to allay dealer concerns, Stanton said IBM would balance 64K chip and 16K chip production of 4300 equipment to fulfill users upgrade needs. He did not know whether IBM would, in the long run, be able to use 64K chips exclusively in the 4300 series.

However, workshop participant Elinor Gebremedhin, project editor of mainframe systems for Auerbach Publishers, Inc., pointed out that by using 64K chip technology exclusively, IBM would be able to reap greater profits from the rock-bottom-priced 4300 series as well as gain a psychological advantage over competitors.

Configured with 16K chips, the 4341s are not particularly profitable, she said, questioning whether IBM would be committed to future maintenance of these products.

Disk Subsystems

Turning to the question of the disk subsystems to be used with the 4300, dealers were miffed by IBM's William Hever, a staff member for intermediate systems marketing, who was prepared only to discuss the performance of 4300s outfitted with 3310 disks.

Pat Baker of Comdisco, Inc. stressed that dealers wanted to learn about the performance of 4300s configured with 3370 and 3340 disk subsystems because these — not the 3310s — are the disks that will be actually used with the 4300s.

Moreover, dealers wanted to know why it will take until next July to obtain 4331 CPUs outfitted with 3344 and 3370 disks, particularly since IBM said only microcode changes would be necessary to allow 4331s to run with these larger disk systems.

Stanton responded that this change required several levels of sign-off within the corporation, but it was clear the dealers did not buy that explanation.

On the whole, dealers were concerned that IBM would not coordinate 3370 orders with 4300 orders. Some dealers said they can't get a shipment date for 3370s from IBM. IBM representatives had no comment on the question of 3370 availability.

On the issue of deliveries, some CDA members claimed some of their customers who were considering used 370 equipment had their 4300 shipment dates moved up. Both Dearborn Computer Co. and Economic Computer Sales, Inc. claimed this has happened.

The problem turned out to be not with IBM corporately, but with salespeople at the branch level who had clout with personnel at the plants, according to Kenneth Bouldin of Economic Computer Sales, who termed the events politics at the marketing level.

Stanton said that IBM categorically denied that deliveries were improved for some users because their salespeople had clout within the organization.

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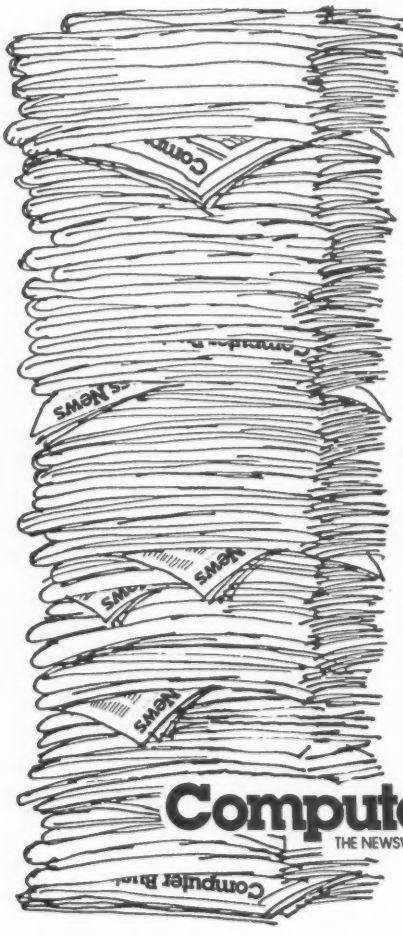

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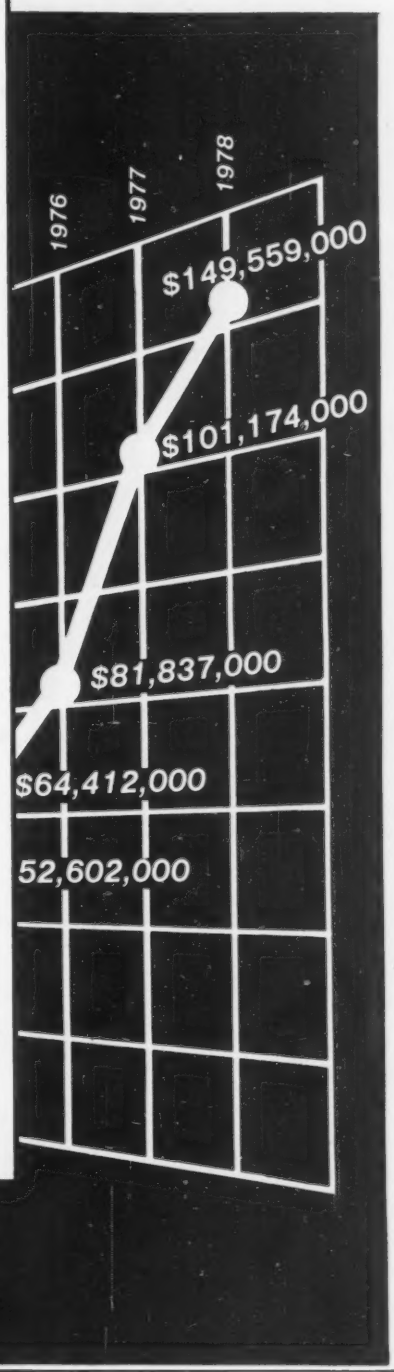

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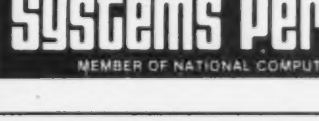

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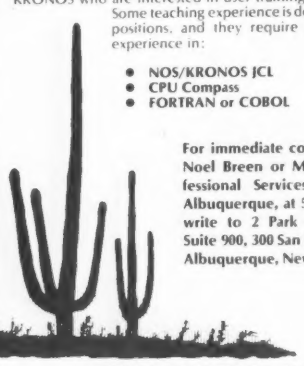

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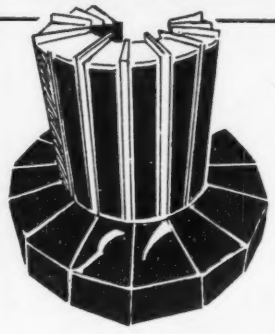

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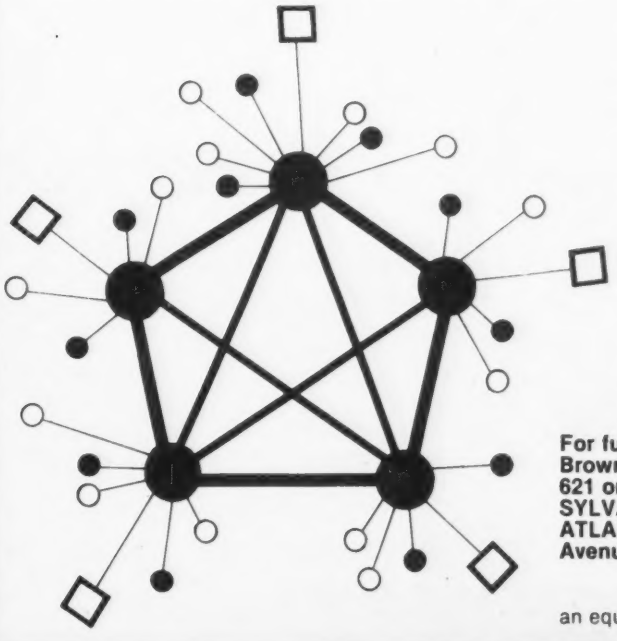

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- **Statistician** — B.S. degree, advanced studies in business desirable. One to three years experience in materials management using computer-based system. Specific experience should include: materials modeling, forecasting, exception and economic analysis, performance evaluation and reporting.
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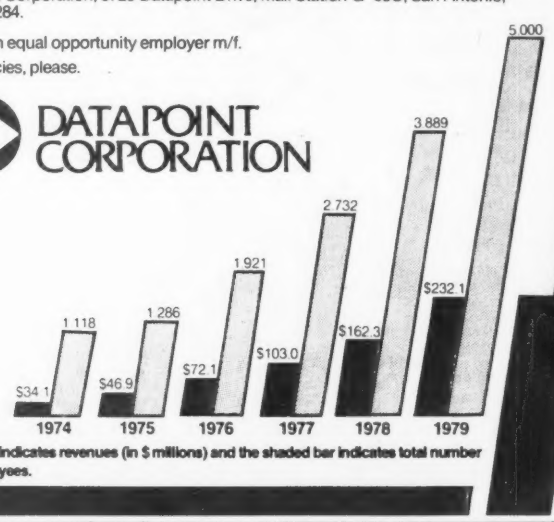

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The National Computer Center houses an IBM 370/158 (4 meg) with teleprocessing and data base management. Agencies using the National Computer Center facilities require technical help on initiating and managing a variety of automated systems, including economic, demographic, and management applications. Some systems are on-line.

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Base salary ranges from $20K to $30K, depending on qualifications and experience, supplemented with a 20 percent differential and other allowances. Furnished housing and local transportation provided. Family to accompany. This is a Federal Government position, but is not in the career civil service.

Send resume or U.S. Civil Service Commission Standard Form 171 to:

U.S. Bureau of the Census
Personnel Division, Room 3245-3
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Attention: Phyllis Green

Or call: Carl Gray (301) 763-2836 for further information.
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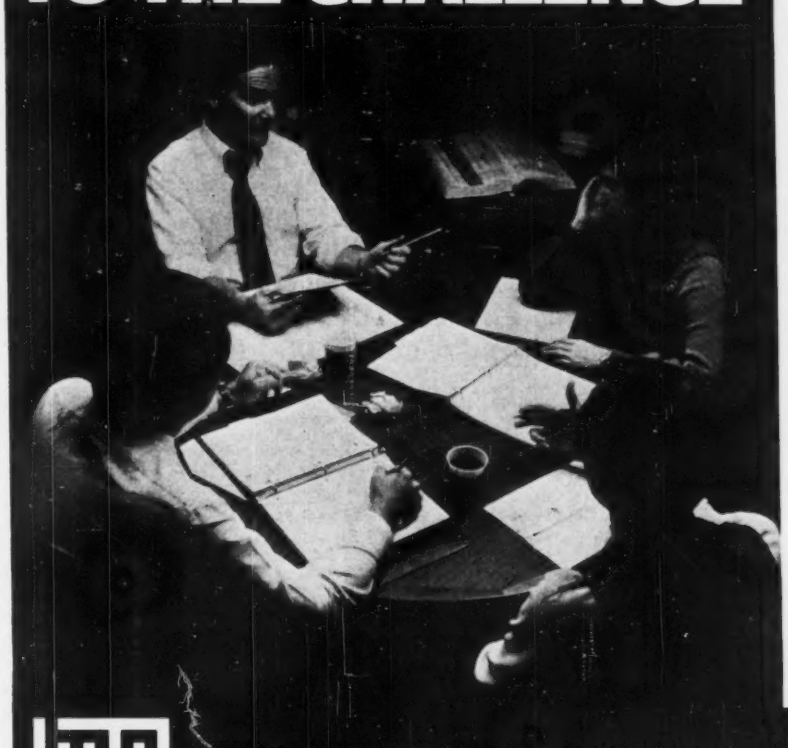

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Data Processing

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American National Bank
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SYSTEMS ANALYST — PROGRAMMER II

The person filling this position must have developed a clear conception of systems development methodology based on at least one year of experience performing systems analysis activities, possess a high level of proficiency in Cobol programming, and be interested in achieving professional growth and responsibility in the area of systems development. Salary range $13,200 — $19,800. Interested persons should submit resumes by December 3, 1979 to:

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Acting Director of Computing
Oberlin College
Oberlin, OH 44074

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If you have talent, experience and a keen interest in making the most of your career, we have the challenge and the opportunity for you. Call collect for John Zuhosky at (512) 250-7452 during normal business hours, or send your resume in confidence to: P. O. Box 2909, M.S. 2208/Austin, TX 78769/Attn: John Zuhosky.

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PROGRAMMERS

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We have an immediate need for an individual with minimum two years experience in IMS data base design and technical support. Knowledge of COBOL, ALC and JCL is also required.

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You will need knowledge of IMS, COBOL, and OS/-JCL on-line program development (TSO), preparation and documentation methods of project implementation, and experience as a project leader in on-line applications.

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You will need knowledge of COBOL, and OS/ JCL. On-line program development (TSO) and project team experience in implementing major on-line data base/data communications helpful.

PROGRAMMER ANALYSTS

You should have business application design experience with knowledge of IBM 360/370, OS/JCL, COBOL, and dump/debug capability. Experience in developing specifications from user requirements and working with MVS data base and decision tables preferred.

In addition to an outstanding compensation, relocation and benefits package, American Express provides a congenial but professional environment employing the latest state-of-the-art technology in a rapidly expanding industry. An ideal climate and the opportunity to advance with a company who has paid dividends for the last 112 years...what more can you ask!

Local interviews will be conducted within the next two weeks. For immediate consideration send your resume including present salary to:

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AMERICAN EXPRESS COMPANY
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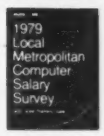

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Manager, Human Resources
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Data Processing

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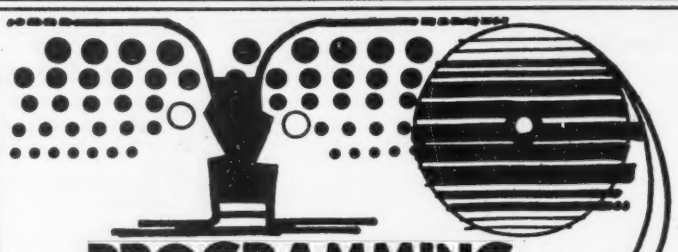

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- **PROGRAMMER/ANALYST**
  Minimum 1-3 years experience with degree in Computer Science, Business Administration or Math preferred. Heavy experience with high level language, i.e., COBOL/FORTRAN, large computer, some user interface and program specification writing. Experience with structured programming, on-line systems, TSO, TOTAL and IBM highly desirable.
- **SYSTEMS & PROCEDURES ANALYST**
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Requirements: Bachelor's Degree and six years' management and/or supervisory experience in data processing, involving planning, systems analysis, computer programming and operations. Applicants may substitute additional management experience as defined above at the rate of six months' experience for each year of the required education. Salary: $31,203 per annum. Excellent fringe benefits. Submit resume, no later than DECEMBER 3, 1979, to:

Mr. Joseph H. Elliot
Personnel Officer
Department of Health and Mental Hygiene
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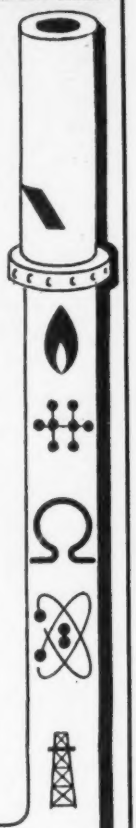

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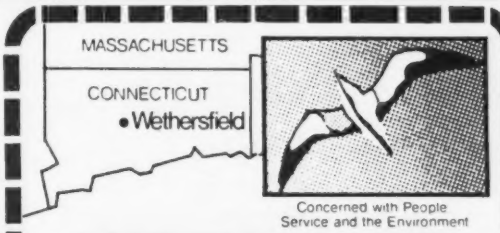

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At CRAY RESEARCH INC, we design, build market and support super-scale computers used in scientific applications. We currently have outstanding opportunities for talented computer professionals.

REGIONAL PRE-SALES ANALYST

This challenging opportunity is available in the Eastern region. A thorough knowledge of operating systems and FORTRAN in a BATCH environment with scientific applications is necessary, with at least 5 years experience as a Pre-Sales Analyst. Experience desired with BATCH OPERATING SYSTEMS. BENCHMARKS and proven aptitude for sales is a plus. Must be willing to travel and able to communicate technical details to sophisticated customers. A degree in scientific fields of computer science, math, physics, engineering or the equivalent is desired.

SENIOR PROGRAMMER ANALYST
(On Customer Site)

Opportunities currently exist in many regions of the country. Duties include serving as a representative to large scale computer users, providing technical assistance and analyzing customer hardware and software requirements. This position requires a college degree in the scientific fields of computer science, math, or engineering or equivalent experience with an additional 3 plus years experience or an advanced degree. OPERATING SYSTEMS and FORTRAN experience in a BATCH environment and the ability to communicate technical details to customers are essential. This position requires some travel.

We provide an orientation program in Minneapolis, Minn. These positions offer excellent growth opportunities, salary and company benefits. Send resume and salary history in confidence to:

C.W. Nelson
CRAY RESEARCH INC
1440 Northland Drive
Mendota Heights, MN 55120
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CRAY

Project Manager

Our Bay Area client has an excellent opportunity for an EDP Project Manager. The successful candidate's background should include:

- Strong leadership skills
- The ability to communicate — both verbally and in writing to all levels of management.
- Knowledge of Banking or Manufacturing Applications and Time Sharing Applications.
- Good working knowledge of COBOL, ALC or FORTRAN.

This position offers an excellent salary and compensation package. We are consultants to management. For immediate and confidential consideration, send resume and salary history to Dan Perkins, Professionals for Computing, Inc., One Maritime Plaza, Suite 1350, San Francisco, CA 94111. (415) 956-7120. Employer assumes fee.

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Technical

We have openings for 3 qualified people to work in our Computer Services Department at our Corporate Research Facility.

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Should have 3 to 5 years of experience in programming on mini-computers in a scientific or real-time process control environment. Prefer DEC PDP 11 computer experience, but would consider other mini-computer experience and Fortan exposure.

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Will be responsible for designing and implementing system support packages on a PDP 11/VAX network. Exposure to data communications and networking concepts desirable. Mini-computer experience with RSX or VMS operating systems a plus.

TIME SHARE CONSULTANT

Responsible for user training and consultation on an in-house time share computer system. Candidate should be experienced using Fortran IV and/or Basic plus II. Position required 4 to 6 years experience in programming and systems analysis plus teaching and communication skills.

Our research center is located in a beautiful rural setting 30 miles east of Cleveland, Ohio. We offer excellent fringe benefits and a salary commensurate with qualifications. Please send your resume and salary expectation to:

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1900 West Loop South, Suite 900
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CHLORIDE INCORPORATED
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NEW ORLEANS AREA
at
NASA's SLIDELL COMPUTER COMPLEX

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Degree in math, computer science or equivalency is preferred.

Company benefits include 2 weeks vacation, sick leave, and 11 holidays plus medical and life insurance coverage, pension and relocation costs. For immediate consideration, call or send resume to:

SDC
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The National Personnel System
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5950 Fairview Road, Charlotte, NC 28210
(704) 554-8771

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PDP11/70 RSTS/E DP2 RMS/11K

Requires 3 to 5 years data processing experience including at least two years experience programming in Basic + under RSTE/E on PDP11. Experience with RMS/11 preferable. Experience in systems analysis and design a plus. Degree preferred. **Send resume & salary history to Jensen Tools Inc., P.O. Box 22030, Tempe, AZ 85282.** EEO/M/F/H.

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For further info on these & other positions call or send resume in confidence to:

Don Harris or Bonnie McKee
(503) 224-9575
811 SW 6th, Suite 710
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Bill Isgrig
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We are a research laboratory seeking a Programmer Analyst to help design and implement on-line medical applications. You will work in a flexible dynamic environment with a small team of medical and computer professionals.

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PROGRAMMERS

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We are actively seeking qualified individuals with a Business or Systems degree, and a minimum of three years' experience in programming. Our challenging openings at present are on the Billing/-Toll Project Team and require a strong background in COBOL. Familiarity with large-scale IBM systems is a plus. Mid-Continent offers a competitive salary and benefit program. More importantly, you'll find that a company dedicated to growth has a strong future profile — and that is vital in the world of Data Processing.

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(216) 650-7143

Mid-Continent Telephone Corporation

100 Executive Parkway, Hudson, Ohio 44236

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Individual will have the following responsibilities: Design data processing systems, including programming, forms design, and manual procedures, supervise up to ten subordinate programming personnel in the areas of documentation verification, standards, monitoring, and technique training; work with toplevel College adminsitrators, suggesting methods, practices, and procedures to improve or replace systems in varied functional areas. MINIMUM REQUIREMENTS: Bachelor's Degree in an appropriate field; five years of data processing experience with an emphasis on systems definition and implementation. At least two years of supervisory experience in an appropriate field may be substituted for the Bachelor's Degree. Analytical experience in a College or University environment is desired. Experience in any of the following areas is desirable: student transcripts, student advisement systems, testing and assessment, institutional research, instructional delivery systems and library systems.

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For a highly qualified applicant we can offer relocation assistance to Salt Lake City, one of the most attractive cities in Mid-America. The area offers a low cost of living, excellent schools and some of the nations finest outdoor recreation and scenery. The importance of this position is reflected in the excellent salary we are prepared to offer. We also provide a complete company benefit package.

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Salt Lake City, UT 84110

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Submit resume in confidence to
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NEIL LANG
CENTRAL EDP
(201) 994-4730
513 W. Mt. Pleasant Ave Livingston, NJ 07039

CRAY RESEARCH
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CRAY RESEARCH is the leader in the large scale computer business. We are a rapidly growing company with a variety of diverse, interesting positions in a small company atmosphere. If you are a talented computer professional and want to help us continue our leadership, we'd like to hear from you. Some of our current openings are:

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OPERATING SYSTEMS DEVELOPMENT: Several openings at all experience levels exist in file management and instruction simulator development.

All Software Development positions are located in Mendota Heights, Minn., a scenic suburb of Minneapolis/St. Paul. They require a degree in math, physics, computer science or equivalent experience.

MARKETING SUPPORT-SYSTEMS ANALYSTS

OPERATING SYSTEMS SUPPORT: Provide operating systems software expertise to support customer installation. Knowledge of scientific applications using FORTRAN is desirable.

FORTRAN APPLICATIONS SUPPORT: Provide expertise in FORTRAN conversion, BENCHMARKS and scientific applications. Knowledge of OPERATING SYSTEMS software is desirable.

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CUSTOMER ENGINEERING

Openings exist for talented computer professionals for challenging assignments at several of our sites. Requires 1 year of experience on large scale computer systems. After extensive on-the-job training on the super scale CRAY-1, the successful candidates will be assigned to customer sites.

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Personnel Department: C.W.

A. E. Kennedy
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Mendota Heights, MN. 55102
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Request for proposal No. 508 due 3:30 p.m. Wednesday, December 19, 1979, for the lease/purchase of a power management system for a state university.
Request for proposal No. 509 due 3:30 p.m. Wednesday, December 19, 1979, for the purchase of a disk and tape upgrade to a Hewlett-Packard 2311A data acquisition and control system with a 2112M processor.
Request for proposal No. 510 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of TTY compatible CRT's. This is a general RFP to be used to select CRT's for the State of Mississippi during 1980.
Request for proposal No. 511 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of ASR and KSR hardcopy terminals. This is a general RFP to be used to select terminals for the State of Mississippi during 1980.
Request for proposal No. 512 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of receive-only printers to attach to TTY compatible CRT's. This is a general RFP to be used to select printers for the State of Mississippi during 1980.
Request for proposal No. 513 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of IBM 3270 compatible CRT's, printers, and controllers. This is a general RFP to be used to select terminals for the State of Mississippi through 1980.
Request for proposal No. 514 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of acoustic couplers. This is a general RFP to be used to select couplers for the State of Mississippi during 1980.
Request for proposal No. 515 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of low to medium speed synchronous and asynchronous modems ranging in speed up to 3600 baud. This is a general RFP to be used to select modems for the State of Mississippi through 1980.
Request for proposal No. 516 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of medium, high, and wideband modems ranging in speed from 4800 through 56K baud. This is a general RFP to be used to select modems for the State of Mississippi during 1980.
Request for proposal No. 517 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of short haul modems, line drivers and modem eliminators. This is a general RFP to be used to select special purpose modems for the State of Mississippi during 1980.
Request for proposal No. 518 due 3:30 p.m., Thursday, January 3, 1980, for the acquisition of printing, interpreting, keypunch-verifiers. This is a general RFP to be used to select keypunches for the State of Mississippi during 1980.
Request for proposal No. 519 due 3:30 p.m. Thursday, January 3, 1980, for the aquisition of micro computers ranging in price up to $5,000. This is a general RFP to be used for acquiring micros for teaching, data acquisition and a variety of other purposes for the State of Mississippi during 1980.
Request for proposal No. 520 due 3:30 p.m. Thursday, January 3, 1980, for the acquisition of graphics terminals, plotters and related peripherals. This is a general RFP to be used to select graphics equipment for the State of Mississippi through 1980.

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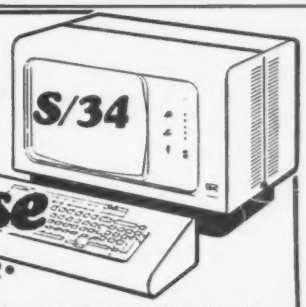

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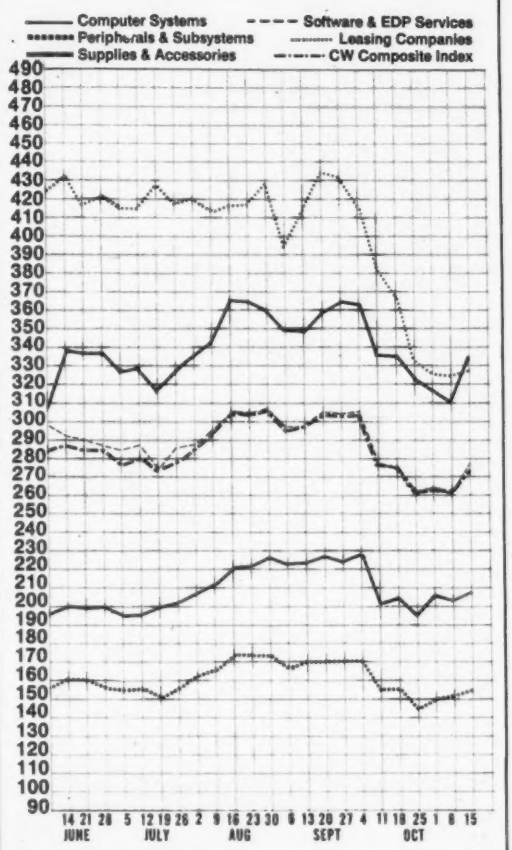
Computerworld Stock Trading Index



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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, NOVEMBER 14, 1979

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1978-79 RANGE (1)	CLOSE NOV 14 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	17- 69	21	+1 3/4	+9.0
N	BURROUGHS CORP	59- 87	73 1/4	+4 3/8	+6.3
O	COMPUTER AUTOMATION	9- 44	8 3/4	+ 1/4	+2.9
N	CONTROL DATA CORP	23- 51	46 5/8	+4 1/2	+10.6
O	CRAY RESEARCH INC	8- 45	38 3/4	+3 1/4	+9.1
N	DATA GENERAL CORP	42- 74	69 7/8	+3	+6.3
N	DATAPOINT CORP	34- 89	88 1/2	+9	+11.3
N	DIGITAL EQUIPMENT	39- 66	63	+4 3/4	+8.1
N	ELECTRONIC ASSOC.	2- 13	6 3/8	+ 3/8	+6.2
A	ELECTRONIC ENGINEER.	9- 19	15 1/8	+ 7/8	+6.1
N	FOUR-PHASE SYSTEMS	19- 46	39 1/2	+4 1/8	+11.6
N	FOXBORO	28- 44	36 3/4	+ 7/8	+2.4
O	GENERAL AUTOMATION	7- 26	15	+1 3/8	+10.0
O	GRI COMPUTER CORP	1- 3	5/8	0	0.0
N	HEWLETT-PACKARD CO	24- 59	55 3/4	+4 1/2	+8.7
N	HONEYWELL INC	43- 83	75	+6	+8.6
N	IBM	62-321	62 1/2	+1	+1.6
O	MANAGEMENT ASSIST	9- 29	19	+1 1/8	+6.2
O	MANUFACTURING DATA S	9- 33	28 3/4	+ 3/4	+2.6
O	MINI-COMPUTER SYST	2- 8	2 3/4	+ 3/8	+15.7
O	MODULAR COMPUTER SYS	7- 18	10 5/8	+ 5/8	+6.2
N	NCR	37- 81	58 1/2	+1 1/2	+2.6
N	PRIME COMPUTER INC	9- 22	16 1/4	+1 5/8	+11.1
N	PERKIN-ELMER	17- 34	34 1/4	+5 1/8	+17.5
N	SPERRY RAND	33- 52	44 1/2	+1 7/8	+4.3
A	SYSTEMS ENG. LABS	11- 24	14 5/8	+1 3/8	+10.3
O	TANDEM COMPUTERS INC	13- 37	32	+1	+3.2
A	WANG LABS.	6- 26	25 5/8	+2 3/8	+10.2

LEASING COMPANIES

EXCH		1978-79 RANGE (1)	CLOSE NOV 14 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COURIER CORP	13- 21	16 3/4	+1	+6.3
O	COMDISCO INC	3- 21	11	- 3/4	-6.3
A	COMMERCE GROUP CORP	1- 1	3/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 7	2 1/8	0	0.0
O	CONTINENTAL INFO SYS	3- 15	2 3/4	0	0.0
M	DATRONIC RENTAL	1- 4	2 1/2	- 1/8	-4.7
A	DCL INC	3- 6	4 7/8	+ 1/8	+2.6
N	DPF INC	8- 14	7 3/4	- 1/8	-1.5
N	ITEL	4- 36	4	- 1/2	-11.1
N	LEASCO CORP	24- 55	46 1/4	+1 7/8	+4.2
O	LEASPAC CORP	1- 4	1/8	0	0.0
A	PIONEER TEA CORP	2- 7	3 1/8	+ 3/8	+13.6
N	U.S. LEASING	12- 20	13 5/8	+1 1/8	+9.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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SOFTWARE & EDP SERVICES

EXCH		1978-79 RANGE (1)	CLOSE NOV 14 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1	+ 1/4	+33.3
O	ANACOMP INC	8- 24	17 1/4	0	0.0
A	APPLIED DATA RES.	8- 17	9	+ 1/2	+5.8
N	AUTOMATIC DATA PROC	24- 40	38 3/8	+1 3/8	+3.7
O	COMPU-SERV NETWORK	5- 16	13 1/4	+2 1/2	+23.2
O	COMPUTER HORIZONS	1- 9	3 1/4	+ 1/4	+8.3
O	COMPUTER NETWORK	3- 16	4 3/4	+ 1/4	+5.5
N	COMPUTER SCIENCES	8- 17	15 1/2	+ 3/4	+5.0
O	COMPUTER TASK GROUP	1- 7	6 1/2	+ 1/4	+4.0
O	COMPUTER USAGE	2- 4	2	+ 1/4	+14.2
O	COMPUT AUTO REP SVC	4- 10	5 1/4	0	0.0
O	COMSHARE	8- 26	16	+ 3/4	+4.9
O	CULLINANE CORP	14- 33	23	+2 3/4	+13.5
O	DATA DIMENSIONS INC	1- 9	1 1/4	0	0.0
O	DATATAB	1- 4	1 1/8	+ 1/8	+12.5
N	ELECTRONIC DATA SYS.	15- 29	23	+1	+4.5
O	INSYTE CORP	1- 3	1 3/8	0	0.0
O	IPS COMPUTER MARKET.	2- 3	3	0	0.0
O	KEANE ASSOCIATES	3- 6	5 1/4	0	0.0
O	KEYDATA CORP	1- 4	3 1/2	+ 3/8	+12.0
A	LOGICON	10- 19	14 1/8	+2 3/8	+20.2
O	NATIONAL DATA CORP	7- 16	14 1/8	+1 1/4	+9.7
N	PLANNING RESEARCH	4- 10	5 3/8	+ 1/8	+2.3
O	PROGRAMMING & SYS	1- 1	1	0	0.0
O	RAPIDATA INC	3- 7	4 1/4	+ 1/8	+3.0
O	REYNOLDS & REYNOLD	18- 36	28 3/4	+ 1/4	+0.8
O	SCIENTIFIC COMPUTERS	3- 9	7 3/8	- 1/4	-3.2
N	TYMSHARE INC	18- 46	44	+2 1/8	+5.0
A	URS SYSTEMS	5- 8	7	+ 3/8	+5.6
N	WYLY CORP	1- 7	4 1/2	+ 1/8	+2.8

PERIPHERALS & SUBSYSTEMS

EXCH		1978-79 RANGE (1)	CLOSE NOV 14 1979	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	13- 32	13 1/4	0	0.0
N	AMPEX CORP	10- 19	17 1/8	+1 3/4	+11.3
O	ANDERSON JACOBSON	5- 12	9 1/2	+ 1/8	+1.3
N	APPLIED DIG DATA SYS	6- 22	7 1/2	+ 7/8	+13.2
O	BEEHIVE INTL	3- 7	3 3/4	+ 3/8	+11.1
A	BOLT,BERANEK & NEW	8- 17	14	+ 1/4	+1.8
N	BUNKER-RAMO	10- 29	25 3/8	+1 5/8	+6.8
O	CAMBRIDGE MEMORIES	2- 9	1 5/8	- 1/8	-7.1
N	CENTRONICS DATA COMP	10- 54	46 3/4	- 1/2	-1.0
O	COGNITRONICS	1- 4	1 3/4	0	0.0
O	COMPUTER COMMUN.	8- 10	4 3/8	- 3/4	-14.6
O	COMPUTER CONSOLES	4- 16	14 3/4	0	0.0
A	COMPUTER EQUIPMENT	3- 6	4 1/2	0	0.0
O	COMPUTER TRANSCEIVER	1- 5	4	+ 1/2	+14.2
O	COMPUTERVISION CORP	5- 43	43	+5 5/8	+15.0
N	CONRAC CORP	13- 26	15	+2 1/4	+17.6
A	DATA ACCESS SYSTEMS	8- 10	6 1/8	+ 1/8	+2.0
A	DATA PRODUCTS CORP	13- 25	17	- 3/4	-4.2
O	DATUM INC	2- 6	2 1/8	0	0.0
O	DECISION DATA COMPUT	2- 6	3 1/8	- 1/8	-3.8
O	DELTA DATA SYSTEMS	1- 1	5/8	- 1/8	-16.6
N	DOCUMATION INC	6- 34	17 1/8	+1 3/8	+8.7
O	DATARAM CORP	6- 32	22 1/2	+ 1/2	+2.2
N	ELECTRONIC M & M	3- 9	3 1/2	+ 1/8	+3.7
O	FABRI-TEK	1- 2	1/2	-	-11.1
O	GENERAL COMPUTER SYS	1- 3	2	0	0.0
O	GENERAL DATACOMM IND	9- 21	15 1/2	+1	+6.8
N	HAZELTINE CORP	10- 19	18 7/8	+1 1/4	+7.0
N	HARRIS CORP	17- 36	28 3/8	- 1/4	-0.8
O	INFOREX INC	2- 11	2	- 3/4	-27.2
O	INFORMATION INTL INC	7- 12	8 1/4	+ 1/4	+3.1
O	INFOTON	1- 3	2 3/8	+ 1/8	+5.5
O	INTEL CORP	20- 65	65 1/4	+4 1/2	+7.4
O	INTERSIL	7- 32	28 1/2	- 1/4	-0.8
A	LUNDY ELECTRONICS	4- 8	6 1/8	+ 3/8	+6.5
O	MSI DATA CORP	8- 19	8	+ 3/8	+4.9
N	MEMOREX	18- 59	23	+ 3/4	+3.3
N	MOHAWK DATA SCI	6- 15	11 3/4	+1 3/8	+13.
O	OMEX	2- 8	8 1/2	0	0.0
O	PARADYNE CORP	9- 23	22 7/8	+3 5/8	+18.8
A	PENRIL CORP	3- 12	11 1/4	0	0.0
N	PERTEC CORP	8- 17	16	+ 1/4	+1.5
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RECOGNITION EQUIP	5- 13	6 1/2	- 3/8	-5.1
O	SCAN DATA	1- 5	1 5/8	-	-3.7
N	STORAGE TECHNOLOGY	14- 46	15 1/8	+1 1/2	+11.0
O	T BAR INC	11- 25	20 1/2	+1 1/4	+6.4
A	TEC INC	6- 13	5 3/4	- 1/8	-2.1
N	TEKTRONIX INC	33- 61	57 1/4	+3 1/8	+5.7
N	TELEX	3- 9	3 3/8	0	0.0
O	TESDATA SYSTEMS CP	8- 26	8	+ 1/4	+3.2
O	WILTEK INC	1- 2	1/2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1978-79 RANGE (1)	CLOSE NOV 14 1979	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	8- 12	10 5/8	+ 1/8	+1.1
O	BALTIMORE BUS FORMS	1- 4	1	0	0.0
N	BARRY WRIGHT	14- 34	19	+ 7/8	+4.8
O	CYBERNATICS INC	1- 1	7/8	0	0.0
O	DUPLEX PRODUCTS INC	13- 31	23 1/4	+ 1/2	+2.1
N	ENNIS BUS. FORMS	5- 21	15	- 1/4	-1.6
N	3M COMPANY	43- 66	49	+ 1/4	+0.5
O	MOORE CORP LTD	20- 34	27 3/4	- 1/4	-0.8
N	NASHUA CORP	18- 37	26 1/8	+ 5/8	+2.4
O	STANDARD REGISTER	20- 29	25	+1 1/4	+5.2
A	TAB PRODUCTS CO	8- 19	14 1/4	+ 3/4	+5.5
A	WABASH MAGNETICS	10- 22	13	+ 1/2	+4.0
N	WALLACE BUS FORMS	18- 33	26 7/8	- 1/8	-0.4

Why do you think they call it a dump?

dump/A dull, gloomy state of the mind, low spirits . . . A thick, ill shaped lump or hunk of anything . . . To deposit something in a heap or unshaped mass, as from a cart.

Webster

In today's sophisticated data processing environment the memory dump remains as an absurd anachronism. Abend-Aid is a software system designed to deal with the problem of abends and the associated memory dumps.

YES

- Abend-Aid is an operating system enhancement which will tell the user in English the exact cause of an abend.
- Abend-Aid will locate all the relevant data to fix the problem.
- Abend-Aid eliminates 95% of the tasks required in reading dumps.
- Abend-Aid has the intelligence to recognize various programming environments such as IMS, RACF, TMS etc.
- Abend-Aid will pay for itself in less than 6 months in most environments — large shops in less than 1 month.
- Abend-Aid uses the power of the computer to analyze and debug abends for all programming languages.

NO

- Abend-Aid is not a dump formatting package.
- Abend-Aid does not require any JCL changes.
- Abend-Aid does not require any modification to IBM code.
- Abend-Aid does not require any user manuals or training.
- Abend-Aid does not require any overhead until a program abends and then it will be less than a system dump.
- Abend-Aid does not require any special compiles or any other action. Only a SYSUDUMP or SYSABEND DD card is necessary.

Put the Abend-Aid workhorse before the cart. Call us today — we can take the load off your computer and your people.

Toll Free 800 · 521-9353 or (313) 559-9050

The only sensible way to handle abends. Abend-Aid.

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